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ORIGINAL ARTICLES.

THE EARLY RECOGNITION OF CANCER OF THE CERVIX UTERI.¹

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SOME apology may seem necessary for introducing a subject which is touched upon in most of the textbooks on diseases of women, and with which we are supposed to be familiar. Having, through my connection with the New York Cancer Hospital, the opportunity of observing a considerable number of cases of incurable malignant disease of the cervix, I am constantly impressed with the frequency with which the mournful statement recurs in the histories of these unfortunates—that their attending physician never told them that there was anything serious the matter with them until their condition had become hopeless. The proportion of inoperable cases sent to hospital is so large, that it seems to me it is high time that the attention of the profession in this country should be called to the fact that we need not expect that our statistics of operations for the cure of cancer of the uterus will ever improve until the general practitioner learns to recognize the existence of the disease before it has reached a stage at which complete extirpation of the organ, if justifiable at all, offers little prospect of permanent relief. A recent German writer (Thiem) following out this line of thought, calls attention to the large number of operable cases treated at the Berlin clinic, as compared with those which come under the observation of surgeons in the smaller Continental cities, and attributes the difference to the fact that in the former the disease is recognized more promptly.

The marked impetus which has been given to the cultivation of skill in gynecological diagnosis has, unfortunately, not extended to the recognition of incipient cancer of the cervix. Cases of neglected ovarian cyst, even in remote country districts, are now so rare, that West's classical description of the final condition of such patients is seldom verified. Thanks to the increased intelligence of the profession, even the more obscure pelvic affections (ovarian and tubal) are often detected and submitted to surgical treatment, thereby saving many women

from years of unnecessary suffering. It would seem strange that when the importance of laceration of the cervix is so widely acknowledged and the lesion is readily diagnosticated, its most serious consequence should be overlooked. Yet there is some excuse for this. So indefinite are the symptoms of commencing epithelioma, and so often are they masked by those referable to coexisting conditions, that specialist and general practitioner are alike deceived. Nothing is more natural or laudable than the desire on the part of the family physician to allay the fears of a patient who suspects the existence of cancer; but, unfortunately, this often leads him to defer the examination until it is too late. The patient herself is then the first to blame him for not insisting upon a measure to which she opposed so many obstacles. Specialists often fail to take into account the difficulties which are encountered by the attendant under these circumstances.

I propose to discuss this subject from a strictly practical standpoint, and shall touch lightly upon facts which are of more interest to the pathologist than to the clinical observer. It would be profitless to dwell upon the relative frequency of the different varieties of cancer of the cervix. I am in accord with Lusk (*American System of Gynecology*, vol. ii. page 602), who says:

"The old familiar division of uterine cancer into scirrhus, medullary cancer, colloid cancer, and epithelioma at the present time has ceased to be tenable. It was based on tactile impressions, physical appearances, and peculiarities of growth. It represented not distinct varieties, but accidental conditions, or successive stages of development. It served to introduce into the subject an element of confusion detrimental to progress, as rarely two observers were found in agreement as to the classification of the disease in the same patient."

There are certain popular fallacies with regard to malignant disease of the uterus, which even yet exercise great influence over the medical mind. I allude more particularly to the importance assigned to the age and so-called "cachexia" of the patient, to hemorrhage, and to the presence of foul discharges from the vagina. Any one who has observed a number of cases of advanced carcinoma of the cervix must have been struck with the large proportion in which some, or even all, of these supposed pathognomonic symptoms are conspicuous by their absence. In over twenty per cent. of the recorded cases the patients are under forty years of age. Within the last year I have seen two women of twenty-four die from a recurrence of the disease, one after amputation of

¹ Read before the New York State Medical Society, February 5, 1889.

the cervix and the other after vaginal hysterectomy. Several women have come to my office with advanced epithelioma of two years' standing, who exhibited but slight evidence of ill-health; one of them has actually gained in weight since I amputated her cervix fourteen months ago.

Many, in fact the majority, of the patients at the Cancer Hospital are singularly free from pain. Pain, when it occurs, is a later symptom, referable to peritonitis rather than to the disease itself. Flooding, sufficient to jeopardize the life of the patient, is exceptional, in my experience. I am inclined to regard it as quite as rare as fatal hæmoptysis. The profuse, foul, watery discharge with which we are so familiar, is by no means a constant attendant of advanced malignant disease, even when extensive ulceration is present; careful observation of patients in hospital and private practice has frequently demonstrated to my satisfaction the fact that it may be slight, even in cases in which a vesico-vaginal fistula has formed. Of course, some allowance must be made for the effect of frequent vaginal injections (especially when the admirable deodorizer creolin is employed), but the cases to which I refer were those of patients who had recently come under observation and had not used any means to secure thorough cleanliness.

These prefatory statements with regard to the negative evidences of advanced malignant disease of the cervix, which are all based on careful records, will serve to show how slight may be the symptoms which attend the same disease in its incipient stage.

"The first symptom in five-sixths of all cases of cervical cancer," says Winckel, "is hemorrhage." Let us not understand by this profuse loss of blood, such as sometimes occurs during the stage of ulceration. The hemorrhage, which is only an expression of the local hyperæmia, may take the form of menorrhagia or metrorrhagia (more commonly the former) and presents different features according as it occurs in patients before, during, or after the climacteric. It has seemed to me in several instances, where the women were under forty, that the menorrhagia, from which alone they sought relief, was directly due to hyperplastic endometritis, and not to the condition of the cervix at all. In two recent cases I did not even suspect commencing epithelioma, but proceeded to curette the uterus and to excise the cervix, as in any case of bilateral laceration with extensive erosion and induration. A large quantity of fungosities was removed, and the hemorrhage was entirely relieved, the subsequent periods being normal. On microscopical examination of both cervixes, there was no doubt as to the presence of malignant disease. Now, in these cases the hemorrhage was clearly due to the diseased condition of the endometrium, which doubtless preceded the development of epithelioma, being only a link in

the pathological chain of which the first was the cervical laceration. I mention this point in order to caution the unwary against the error of inferring that because they have removed the immediate cause of the menorrhagia, nothing more remains to be investigated.

In these young women, I would lay particular stress upon one symptom, which is apparently so unimportant that it often passes unnoticed; I allude to slight hemorrhage (often a mere "show") after coitus. Most of the books mention this, but few emphasize its importance. If you take the trouble to question patients about this sign, you will be surprised to find how often it can be identified as the initial objective symptom of malignant disease. I need not enter into an explanation of its cause. Women of the better class will of course rarely mention it unless questioned, but I hold that it is the physician's duty to inform himself on this point whenever he has the slightest suspicion of a sinister condition. Less often the same bloody discharge is noticed on straining during defecation. This single symptom, hemorrhage after coitus, led me to examine and to detect cancer of the cervix in a robust German woman, who had never had a single pain referable to the pelvic organs.

Irregularity in the recurrence and variation in the normal amount of the menstrual flow, are regarded by both the laity and profession as indicative of the approaching menopause. Börner, who has written the most recent monograph on this subject, lays great stress upon the fact that these "atypical" hemorrhages are frequently pathological in their character, the increased flow being really due to some morbid condition of the uterus. The patient is lulled into a sense of security, not only by her own feeling that her symptoms are due to the change of life, but by the assurance of her physician, who too easily concurs with her opinion and thinks that an examination is unnecessary. How often are gynecologists called to see women with fibroid tumors, who have been allowed to bleed for months until they have become almost exsanguinated, while they have been treated "expectantly," with the idea that hemorrhage was physiological and would cease spontaneously! Cancer of the cervix, of course, does not give rise to such profuse menorrhagia, but it causes an increase in the menstrual flow too marked to be referred to the climacteric alone. Even a bare suspicion that the condition is hyperphysiological should lead us to investigate thoroughly, since we know that malignant disease of the portio develops in the majority of cases in the fifth decade. The advice given by Hart and Barbour is sound, viz.: "In all cases in which a patient over forty years of age seeks advice with symptoms referable to the pelvis, a careful examination should be made."

There are certain peculiarities with regard to the

establishment of the menopause which should especially awaken our suspicions. Premature climacteric hemorrhages (between thirty-five and forty) are usually pathological; of still more doubtful import is menorrhagia prolonged after the age of fifty.

Börner goes so far as to state that in such women "the most perfect regularity in the monthly flow does not justify us in deciding at once that the conditions are normal, and that there is simply a delayed menopause."

Post-climacteric hemorrhages, it is hardly necessary to add, are a sinister omen. If they occur soon after the establishment of the menopause, both patient and physician may fall into the error of regarding them as simply a recurrence of the former menorrhagia; but, these hemorrhages are usually slight and insignificant, appearing at irregular intervals. There may be simply a pinkish discharge, which bears no resemblance to the atypical bleeding. Women are more likely to notice this symptom now than they were in earlier life, because they are always on the lookout for cancer after the "change." But, in spite of this, experience shows that even in such cases the existence of malignant disease is not recognized as promptly as it should be.

Pain in commencing epithelioma, as I have before stated, is seldom of such a nature as to afford a clew to the condition present. It seems to me an error to refer to any particular variety of pain as pathognomonic of malignant disease of the uterus. In the earlier stage the patient may have only an occasional vague, shooting pain in the back or in the lower part of the abdomen; or it may be of a dull, aching character. It should be remembered that she has already an extensive laceration of the cervix of long standing, and probably the remains of former peri-uterine inflammation, the symptoms of which would mask any fresh ones produced by the incipient cancer. I have noted that pain in the left sciatic nerve was the first symptom of beginning trouble in a patient in whom there was absolutely no indication of pelvic disease. The neuralgia was peculiarly intractable and had been treated for some time before she came under my care. It ceased immediately after amputation of the cervix and has never returned. Since my attention was called to this symptom I have observed it in other cases.

The characteristic watery discharge is not observed until ulceration occurs. But profuse leucorrhœa (without odor) is a common accompaniment of cervical erosions. When it is frequently streaked or tinged with blood, it becomes significant.

These symptoms, slight as they are, are all which have been noted in connection with incipient malignant disease of the cervix. They are so indefinite, that unless we are in the habit of regarding every pelvic trouble as serious until it is proved to be otherwise, we shall frequently either overlook

them entirely, or regard them as not sufficiently important to justify an examination. Hebra used to say: "Any one can have syphilis." We might add: "Any woman may have cancer."

Supposing we are led to make a vaginal examination, are the feel and appearance of the cervix sufficiently characteristic to clear up all doubt regarding the diagnosis? I cannot answer unhesitatingly in the affirmative. The examining finger encounters a large indurated cervix, presenting a unilateral (or, more commonly, a bilateral) laceration, with eversion of the lips. The soft, velvety sensation imparted by the erosion may be masked by the general induration, which, it is important to note, is not confined to the angle of the tear. The everted mucous surface bleeds more readily than a simple erosion. Instead of the ovula Nabothi usually felt, small, hard nodules are often present. Spiegelberg's test—immobility of the mucous membrane over the subjacent indurated tissue—is of no practical value. I would rely principally on the general sclerosis of the hypertrophied cervix, associated with bleeding of the everted mucous membrane. The uterus is usually enlarged, but this enlargement is of long standing, resulting from the original laceration; it is, as a rule, movable at this stage. The cervix is often quite insensitive, although tenderness is more likely to be present than after ulceration has occurred. Inspection of the diseased parts through the speculum adds but little to the information obtained by the touch. The examiner sees a hypertrophied cervix with an angry-looking erosion. According to Stratz (*Zeitschrift für Geb. u. Gyn.*, Bd. xiii. Heft 1), a sharp line of separation between the diseased and healthy tissue will be observed, the former occupying a somewhat higher level. Scattered through the latter will be seen glistening, yellowish-white nodules, which on section present a granular appearance. It is safe to say that these are not constantly present; they are rather a manifestation of that form of carcinoma which begins as nodules beneath the mucous membrane. Schroeder believes that every papillary growth on the cervix having a broad base, should be regarded as cancerous; on the other hand, if a papillary ulcer is surrounded by a zone of follicles it is more likely to be benignant.

The text-books instruct us in case of doubt to excise a piece from the cervix and to submit it to microscopical examination. This is excellent advice, which certainly should be followed in every instance where the decision of the surgeon with regard to the performance of a radical operation is based entirely upon the pathologist's report. I would have had less cause for regret if I had not omitted to take this precaution on one occasion. But the pathologist sometimes rightly declines to shoulder all the responsibility. The microscopical appearances

of the suspected tissue are such that he does not feel justified in giving a positive opinion with regard to its malignancy. With Virchow's experience fresh in our minds, we cannot afford to blame any microscopist for sometimes hesitating. I have dilated on this subject in a recent paper on "The Microscopical *versus* the Clinical Evidences of Malignant Disease" (*N. Y. Medical Journal*, June 18, 1887), in which I called attention to the fact that it was sometimes necessary to examine many sections of suspected tissue before one was found which justified the pathologist in making the diagnosis of cancer, and that the small fragment submitted for examination might not be taken from the most characteristic portion of the cervix. In short, the evidence afforded by the microscopical examination may be entirely negative.

In excising a fragment for examination, be careful to take out a generous wedge, including both the mucous membrane and the subjacent muscular tissue. The pain is insignificant, so that I never use an anæsthetic. Select the most suspicious spot; seize the underlying tissue with a tenaculum, and remove the wedge with two snips of the scissors. I shall not enter upon a description of the microscopical appearances in simple erosion and in epithelioma, but shall merely call attention to the main point which should be considered in deciding upon the character of the suspected tissue. It is not enough, as Friedländer clearly shows, to apply Waldeyer's definition of cancer—"an atypical proliferation of epithelium"—since the same atypical cell-processes may be seen in sections of a simple erosion. Evidence of active cell-proliferation, granulation tissue, glandular hyperplasia—all these may accompany a purely benignant condition. The malignancy of the process is shown by its disposition to invade the deep-lying parts, while an innocent growth remains limited to the tissue from which it originated. Friedländer expresses this so clearly that I quote the following from his work on "Microscopical Technology": "If we discover in the uterus that the process is not confined to the mucous membrane, but that it also invades the muscular tissue, and that the muscle is partly replaced by granulation tissue traversed by outgrowths of atypical epithelium, we have to do with a clearly malignant element, and then only do we make the positive diagnosis of cancer." It will be evident from this that you cannot blame the pathologist if he refuses to give you a positive opinion unless you send him something more than a mere snipping from the hypertrophied mucous membrane.

There should be little room for doubt regarding the proper treatment of these cases, whether cancer has actually developed or not. In every case of laceration of the cervix, accompanied by extensive erosion and induration of the subjacent tissues, the

proper course to pursue is to excise all the diseased tissue, even if this involves ablation of the entire cervix. This is only following Emmet's teaching in regard to the thorough excision of the "cicatricial plug." "I have always," he states, "advocated and practised removal of the cervix where the tissues have become so degenerated that the fear of epithelioma might be entertained. The occasion is rare, but recently I have resorted to the operation in several instances as a precaution, from witnessing epithelioma spring up in a case in which I had trusted too much to the reparative power." It seems to me that "excision" is a more correct designation for the operation than "amputation;" the latter is more properly applied to removal of the cervix in cases of actual elongation or hypertrophy. Excision, as I understand it, is by no means so rarely indicated as one would infer from the above quotation, and it would be well if it were practised more frequently instead of simple repair of the existing laceration. The same rule applies here as in any operation for the removal of neoplasms in general surgery—amputation of the breast, for example—to excise freely all suspicious indurated tissue bordering on the original wound.

It is unnecessary to dwell upon the technique of excision, which is somewhat similar to that of Schroeder's operation for the radical cure of cervical endometritis, the vaginal mucous membrane being preserved in both instances, although in the former much more of the cervical tissue is removed. The introduction of a plug (of iodoform-gauze or glass), in order to keep the canal patent, is an important point, nor should it be forgotten that the sutures must be inserted more deeply than usual if the surgeon would insure union of the underlying parts. Silver wire can alone be depended upon in these cases. The inexperienced operator must be neither too timid nor too bold, since he will, on the one hand, not remove all the diseased tissue, or, on the other, he will enter the subperitoneal space—an accident which may lead to unpleasant consequences if the operation is not thoroughly aseptic. The latter will be avoided by always cutting toward the centre. If this caution is followed, the apex of the cone may be as high as the os internum, the mucous lining of the entire cervical canal being removed with the cone. Remembering the insidious manner in which cancer originates in, and creeps along, the cervical endometrium, it will be apparent that an attempt to preserve a strip of undenuded tissue in the canal will probably defeat the object of the operation, which is to remove all the diseased portion of the cervix, and thus to provide against future recurrence.

The fear of hemorrhage during operations on the cervix is incomprehensible to those who have had much experience in minor gynecological surgery.

The "circular artery" is a veritable bugbear. Out of five or six hundred operations which I have observed, I cannot recall one in which the bleeding was not promptly and effectually controlled by a single deep suture. It may be asked: "Can excision be properly performed by the general practitioner?" Why not, providing that he is competent to repair a laceration of the cervix? It is important to note, however, that one must be able to deal with every complication that arises, the same as the would-be laparotomist. It is certainly unfortunate for a tyro to subject a woman to a laparotomy which is not completed simply through his timidity or lack of experience; on the same principle, the general practitioner, whose experience is necessarily limited, may shrink from excising the entire cervix when necessary, confining himself to a partial operation which is worse than useless. It is better to allow to heal by granulation rather than to obtain perfect union at the expense of leaving behind a focus of malignant disease.

A word with reference to the ultimate results of excision. I would not be understood as urging it as a substitute for a more radical operation, when the latter is clearly indicated, but I do regard it as the only justifiable measure when the cervix is only "suspicious." A sufficient number of cases of vaginal hysterectomy (some of which terminated fatally) for simple erosion of the cervix are on record to render us somewhat cautious about resorting to this radical treatment until the disease has developed beyond the shadow of a doubt.

Excision is a simple, safe, and effective operation, unattended by subsequent complications, which often nips the disease in the bud, so that it never returns. Even if it does, the recurrence is promptly observed, and high amputation or vaginal extirpation may then be performed just as well as at first. Another consideration, by no means unimportant, is the fact that by performing the minor operation we spare the patient the thought that her condition must be wellnigh hopeless in order to call for removal of the entire uterus. The dreaded word "cancer" need not be mentioned, neither is it necessary to impress her with our own gloomy forebodings. It is enough to explain to her that her condition is such that the prompt performance of a minor operation will save her serious trouble in the future. By the exercise of a little tact, she may be spared the knowledge of how narrowly she escaped that danger, as well as the agonizing doubt of patients who live in constant dread of a recurrence of the disease.

Summary.—The majority of the cases of cancer of the cervix uteri do not come under the observation of the surgeon before the disease has progressed so far that it is impossible to perform a successful

radical operation. The attending physician is too often responsible for this delay, although he is not entirely inexcusable for misinterpreting the initial symptoms.

The symptoms of incipient malignant disease of the cervix are seldom characteristic, but they are such as to awaken suspicion and to justify an examination. Slight, irregular hemorrhages, especially after coitus, are always significant, above all in women who have passed the menopause. Pain is seldom characteristic. There is no offensive discharge in the early stage.

Hypertrophy and general induration of the cervix, accompanying an erosion which bleeds easily to the touch, should lead the physician to confirm the diagnosis by excising a fragment of the suspected tissue and submitting it to microscopical examination.

A positive opinion regarding the presence of malignant disease is justified only by the finding of processes of atypical epithelium which invade the subjacent muscular tissue.

Excision of the cervix should be performed in every case of extensive erosion with general induration, whether cancer has actually developed or not. This is often sufficient to insure a cure, and thus to render a radical operation unnecessary. If the disease recurs, the uterus may be extirpated subsequently.

OBSERVATIONS ON THE DIGESTIVE FERMENTS.¹

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RECENT years have witnessed a marked development in our knowledge of the physiology of digestion. A great mass of histological and physiological details has been gradually accumulated by which a clearer insight has been obtained into many of the processes of secretion, digestion, and absorption. Chemical science has lent its aid and given us light on the composition and character of the digestive juices and on many hitherto obscure points in the metamorphism of the various food-stuffs, and at the same time taught us to appreciate its value in the study of scientific medicine.

There is, I think, no branch of medicine in which a proper appreciation and true understanding of physiological processes are so necessary as in the pathology of digestion. In the words of Dr. Ewald, "digestion is comparable to a complicated clockwork, the derangements of which are readily shown by the movements of the hands, but the causes of which are difficult to discover from the complexity and concealed position of the movement. Therefore, the

¹ Read before the Section on Pædiatrics of the New York Academy of Medicine, January 23, 1889.

pathology of digestion requires a well-grounded knowledge of the complex processes which effect the transformation of our food into chyle."

Among the more recently acquired facts pertaining to digestion, none are of more importance than those which relate to the digestive ferments. In the processes going on in the alimentary canal, by which the nutritive portions of the food are transformed into soluble and diffusible products fitted for the nourishment of the blood and of the tissues, ferments play an all-important part; without the action of the unorganized ferments, the nutrition and life of the organism would be impossible. As you well know, the more important digestive ferments or enzymes are of two kinds: amylolytic, acting on starchy matter, and proteolytic, acting on the albuminous food-stuffs. As examples of the former, we have the ptyalin of saliva and the amylase of pancreatic juice, as well as the diastatic ferment of the bile; as examples of the latter, the pepsin of the gastric juice and the trypsin or pancreatin of the pancreatic fluid.

The terms fermentation and ferment may be variously defined, but yet, after all, we cannot add much to the definition current in the fourteenth century, viz.: "a force which without becoming weaker itself can produce great effects in other masses." We know that this is not strictly correct, yet the amount of ferment involved in any given fermentation is, as a rule, so infinitesimally small, so out of proportion to the magnitude of the chemical processes or changes caused by it, and at the same time so continuous in its action, that we may well marvel at its power and wonder at its methods. We feign knowledge, however, and call it a *catalytic* action, a term which clearly exposes our ignorance but which helps to foster our self-esteem.

The amylolytic and proteolytic ferments are alike in that they act only in the presence of water; that the products of their action contain, as a rule, more oxygen and hydrogen than the original matter, thus implying a hydration process; and that their action is most energetic at the body temperature. They differ, however, in the medium in which they act: the amylolytic ferments being most energetic in a neutral fluid, wholly inactive in the presence of free acid; the proteolytic ferment pepsin, on the other hand, acting only when in combination with an acid, preferably hydrochloric, while trypsin acts best in an alkaline medium, although also active in a neutral fluid. These, what may be called minor points of difference are essential ones, however, and serve important purposes in the economy. For, the ferments are extremely sensitive to the action of foreign matters and the simple changes of reaction from acid to alkaline, and *vice versa*, met with in the alimentary tract are sufficient to destroy the different ferments as they are exposed

to the changed conditions in their journey onward, and doubtless only such escape destruction as are absorbed and ultimately excreted through the kidneys. Thus, as we shall see, the amylolytic ferment secreted by the salivary glands is undoubtedly destroyed by the acid of the gastric juice, the proteolytic and rennet ferments secreted by the gastric glands are destroyed by the conjoined action of trypsin and the alkaline salts of the pancreatic and intestinal secretions, while the ferments of the pancreatic juice are probably in turn destroyed, at least in great part, by the acids of the large intestine.

Bearing in mind the extreme importance to the economy of these unorganized ferments, it may not be amiss to consider briefly some of the conditions which modify their activity. I am aware, however, that I am dealing with a much-abused subject, one possibly worn threadbare, certainly one concerning which of late years much has been said and written. But there are many conflicting statements, many downright contradictions, and I have ventured out of my experience in the laboratory to present to you the results of my own observations, enlarged somewhat by those of others which have seemed to me worthy of credence. A somewhat continuous study of the digestive ferments in their relation to normal digestive action has led to an accumulation of data,¹ most of which, to be sure, have come from bottle and test-tube study, but yet I think not to be ignored on that ground, nor on the other hand to be accepted necessarily in their entirety, but to be looked upon as statements of fact so far as they go, and as suggestions to be tested clinically when of sufficient importance. So far as the pure chemistry of digestion is concerned, the nature of the ferments and their action, the influence of various agents on their activity, etc., the laboratory is the proper place for such study and the data so obtained may be of great advantage in pointing the way for clinical experiments. It is to be ever borne in mind, however, that the living alimentary tract is a somewhat different mechanism from a glass beaker and that in the former we have to deal with a complication of conditions not met with in our artificial digestions.

In considering first the action of the amylolytic ferments, we will speak only of the ptyalin of saliva and the diastase of malt; the one as an illustration of a normal digestive ferment, the other as a good example of a common remedial agent.

What is true, however, of the ptyalin of saliva is also applicable to the amylolytic ferment of the pancreatic fluid.

Human mixed saliva as ordinarily secreted has an alkaline reaction, the average of fifty-one samples

¹ See Studies from the Laboratory of Physiological Chemistry. Sheffield Scientific School of Yale University. Vols. i.-iii.

showing an alkalinity equal to 0.08 per cent. sodium carbonate. The highest amount found was 0.144 per cent., the lowest 0.059 per cent. In spite of this being the normal reaction of the secretion, its power of digesting starch is far greater when the fluid is exactly neutral than when alkaline, a difference which shows still more distinctly the greater the fluid is diluted. The ferment acts most energetically in a neutral fluid. The same is true of the diastase of malt, its diastatic action showing stronger in a neutral fluid than in an alkaline medium. Increasing the alkalinity of the fluid, either diastase or saliva, tends to retard the amylolytic action of the ferment, the extent of retardation being in proportion to the amount of alkali carbonate present. The percentage of alkali, however, which hinders diastatic action can be designated only for definite mixtures, being dependent upon the dilution of the fluid and consequently upon the amount of albuminous matters and inorganic salts present. The presence of 0.3-0.5 per cent. sodium carbonate will almost entirely stop the action of undiluted saliva on starch, while with neutral saliva greatly diluted the presence of even 0.005 per cent. sodium carbonate will diminish decidedly the action of the ferment. Dilute alkalies not only hinder the action of these amylolytic ferments, but they also destroy them, especially at the body temperature. Their destructive power, however, is not as great as their retarding action. While these facts plainly indicate the extreme sensitiveness of the ferments toward alkaline fluids, we must not be too hasty in assuming a destructive action whenever alkalinity becomes pronounced. Peptones and proteid matters, in general, all tend to diminish and even prevent in part the retarding and destructive action of dilute alkalies, hence in the intestinal canal and elsewhere where the products of proteolytic action or other forms of proteid matter are present, the amylolytic ferments may endure the presence of amounts of alkalies which alone would quickly lead to their destruction.

Toward acids, the amylolytic ferments, both ptyalin and diastase, are more sensitive even than toward alkalies. When diluted, neutral saliva or a solution of diastase is mixed with diluted hydrochloric acid in such proportion that the mixture contains only 0.003 per cent. of the free mineral acid, amylolytic action is stopped almost completely. With 0.005 per cent. of free hydrochloric acid destruction of the ferment is complete in a very short time, especially at the body temperature.

It has been generally held hitherto, and is even now to some extent, that the ferments of saliva and diastase as well regain their power of transforming starch into sugar when they reach the small intestine, where the contents are alkaline, this view assuming that in the stomach the activity of these

ferments is simply suspended by the acidity of the gastric juice. It has even been questioned whether the acidity of the stomach contents ever becomes sufficiently great to stop completely the solvent action of the amylolytic ferments on starch.

Many eminent authorities stand committed to this view of non-destruction by the gastric juice, but it is a question easily settled by experiment, and I am quite convinced that the presence of a few thousandths of one per cent. of free hydrochloric acid is sufficient to stop quickly all amylolytic action. We are to bear in mind, however, that because a fluid reacts acid to test-papers, it does not necessarily follow that it contains free acid. In gastric juice, for example, especially after digestion is well under way, there are present comparatively large amounts of albumoses, peptones, etc., all of which unite with the acid of the gastric juice, forming a loose chemical combination, to be sure, but yet one in which the acid is far less powerful toward ferments at least than when uncombined.

Hence the question of retardation and destruction of amylolytic ferments in the stomach needs further consideration; we need to know how the presence of proteid matter affects the action of the acid of the gastric juice, and we find, by experiment, that nearly all forms of albuminous matter prevent, to a certain extent, the destructive action of the acid. The acid-proteids formed, however, have more or less of a destructive action themselves, and when all the proteid matter present in a given mixture is completely saturated with acid, although no free acid may be present, the amylolytic ferments soon lose their action on starch, and in a short time are completely destroyed. Hence it follows that while the proteids of the food probably protect for a time the ptyalin of the saliva, or other amylolytic ferments introduced, by combining with the hydrochloric acid as it is secreted, in a very short time these must become saturated, and free acid be present; and as soon as free hydrochloric acid is present, or even before, a rapid destruction of the amylolytic ferments must take place. And to this destructive action must be added, also, the slower action of the acid-proteids. That free acid is normally present in the stomach contents can be easily shown by several tests, notably with tropæolin oo. The length of time after the ingestion of food, before free acid makes its appearance in the stomach must be variable, dependent in great part upon the amount and character of the food taken.

There is, I think, among many physiologists a growing impression that for fifteen to thirty minutes after taking food an active digestion of starch goes on in the stomach. Von Velden¹ found, by methods perhaps somewhat questionable, that for a time vary-

¹ Zeitschrift für physiologische chemie, 3, p. 205.

ing from three-quarters of an hour to two hours after eating, the fluid in the stomach, obtained by a stomach-pump, gave no color reaction with methyl-aniline violet or tropæolin for free acid, although the mixture showed an acid reaction to test-papers. Uffelmann,¹ likewise, found a similar absence of free hydrochloric acid in the case of a boy with a gastric fistula, and fed on a mixed diet, free acid appearing from forty-five to sixty minutes after the ingestion of food. Kretschy and Seemann obtained similar results. More recent experiments of Ewald,² however, appear to show that the time of appearance of free acid depends entirely on the food; thus, in one experiment, with a person where vomiting could be produced at will, a meal of sixty grammes of wheat bread was followed by the appearance of free hydrochloric acid in the stomach contents in thirty minutes; with hard-boiled eggs, even after fifteen minutes. With a moderate meat diet (120 grammes) free hydrochloric acid was detected only after one and a half hours. Further, Ewald and Boas,³ by experiments on inmates of the "Städtischen Frauen-Siechen-Anstalt," Berlin, have found that on feeding starch-paste (200-300 c.c.), made from either potato or wheat starch, free hydrochloric acid appears in the stomach contents very quickly. The experiments were conducted on patients with sound stomachs, the stomach being empty, and indeed rinsed out with water just prior to the experiment, and the wash-water proved free from acid. In this way they found that the ingestion of the starch-paste was followed in one case by the appearance of free hydrochloric acid in ten minutes, the fluid vomited containing 0.04 per cent. HCl, the acid increasing after twenty-seven minutes to 0.28 per cent. In another experiment, after the same order, 0.13 per cent. HCl was found in the fluid ejected after fifteen minutes, while at the end of thirty minutes the acid had increased to 0.29 per cent. In no case was lactic acid found in the ejected matter.

These same investigators have also, in part, confirmed our statements regarding the action of acids on the amylolytic ferment of saliva, by a series of interesting clinical experiments on patients in the Frauen-Siechen-Anstalt. By feeding a one per cent. starch-paste solution to which a definite amount of hydrochloric or other acid had been added, to patients whose stomachs had been previously rinsed with water, they found that the smallest percentage of hydrochloric acid which would hinder the formation of reducing substances was 0.066 per cent., the stomach contents being ejected or withdrawn five to forty-five minutes after the ingestion of the starch. With some patients, however, the acid could be raised to 0.1 or even to 0.12 per cent., and still

have a trace of reducing bodies formed, the latter being presumably sugar. With lactic acid, the amount could be raised to between 0.1 and 0.2 per cent. and still have some starch converted. With butyric acid, 0.2 per cent. allowed some conversion. It must be remembered, however, that these percentages are simply the percentages of acid in the starch-mixture introduced into the stomach, and not the percentages of acid in the stomach contents, where there would naturally occur a dilution and partial neutralization from the inflow of alkaline saliva, counterbalanced, perhaps, by the secretion of acid gastric juice.

The most important point in this connection, however, is the fact that such conversion of starch as does occur in the stomach under these circumstances, takes place during the first five minutes, the amount of sugar found in the ejected fluid being the same at the end of five minutes as at twenty minutes; further, the amount formed is quite small, implying that the ferment is quickly stopped in its action by the acid present. Ewald also concludes that the presence of 0.077 per cent. of hydrochloric acid is sufficient, under the above circumstances, to destroy completely the ferment.

Coupling these facts with those already mentioned, I think we can safely conclude that the action of the diastatic ferments can, at the best, continue only for a short time in the stomach, and that cessation of amylolytic action is quickly followed by destruction of the ferment, through the action of the free and combined hydrochloric acid. Further, it is obvious that the administration of diastatic ferments, however active, by mouth, with the intention of supplementing the pancreatic digestion of starch in the small intestine, can be of little value, since the ferment must inevitably be destroyed before reaching the seat of action.

The extreme sensitiveness of the amylolytic ferments toward acids is substantiated by their behavior toward many common therapeutic agents;¹ many of the so-called antiseptics and germicides likewise show marked action on these ferments, even when present in very small quantities. Mercuric chloride or corrosive sublimate, also mercuric iodide and bromide retard the action of the amylolytic ferments, even when present in a few thousandths of one per cent. Curiously enough, mercuric cyanide, when present in small amounts, appears to increase the solvent action of these ferments on starch. Large percentages, however, retard their action. Sulphate of copper has a very marked inhibitory action, while lead acetate has a retarding action only when present to the extent of two or three per cent. Arsenious oxide and ammonium

¹ Jahresbericht der Thierchemie, 1880. p. 302.

² Virchow's Archive, vol. cl. p. 362.

³ Virchow's Archive, vol. civ. p. 272.

¹ For the quantitative data, showing the exact amount of retardation or stimulation of amylolytic action, see vol. i. of Studies in Physiological Chemistry, Yale University.

arsenate, in small fractions of a per cent., both cause neutral saliva to convert a larger amount of starch into sugar than the saliva alone would do, while arsenic acid retards the action of the ferment. Tartar emetic, in small amounts, has a marked stimulating influence on the salivary ferment, but large amounts, as five per cent., very noticeably diminish the amount of sugar formed. Potassium chlorate, in small quantities, increases the amylolytic action of saliva, while the presence of even five per cent. of the salt has only a slight retarding effect. Sodium chloride, likewise, has a slight stimulating action, and large percentages cause only a slight diminution in the amount of starch dissolved. Many of the alkaloidal salts cause the salivary ferment to form an increased amount of sugar, apparently through stimulation of the ferment, notably morphine sulphate, quinine sulphate, cinchonine and cinchonidine sulphates, atropine sulphate, and brucine sulphate. Strychnine sulphate, on the other hand, has a slight retarding action on the ferment. Antipyrin and antifebrin both have a slight inhibitory action on the salivary ptyalin. Urethan, in small fractions of a per cent., has a slight stimulating action, while larger amounts diminish somewhat the quantity of sugar formed. Thallin sulphate, in very small percentages, has a noticeable stimulating action, while paraldehyde has a marked inhibitory effect.

Of gases, oxygen and carbonic acid both decidedly increase the amount of sugar formed by neutral saliva, while hydrogen noticeably diminishes the action of the ferment.

Pepsin, the best known of the proteolytic ferments, and perhaps the most important, has been the subject of study for many years. Ever since Eberle, in 1834, called attention to the solvent power of an acid extract of the stomach mucosa, investigators have been at work in a vain attempt to isolate the active principle in a pure state. Schwann named the hypothetical substance pepsin, and Wasmann, just fifty years ago, made an elaborate but fruitless attempt to isolate the pure ferment. Even at that time the powerful digestive properties of the ferment were recognized, for Wasmann states that a weak acid solution, containing only $\frac{1}{10000}$ part of the impure ferment, will dissolve coagulated albumen in from six to eight hours. A long row of illustrious names may be added to the list of those who have endeavored to widen our knowledge of this proteolytic ferment. Pappenheim, Valentin, Elsässer, Frerichs, C. Schmidt, and many others may be mentioned as among the first to work upon this subject, while nearly every prominent physiologist since has made some contribution to broaden our knowledge of this digestive ferment.

Among the many facts connected with the proteolytic action of pepsin, which it is important for us to

remember, is that the acidity of the gastric juice is mainly due to free hydrochloric acid. The elaborate experiments of Bidder and Schmidt still stand the test of criticism, and while we have many times, especially in disordered conditions of the stomach, lactic, butyric, acetic, and possibly other acids present in the stomach contents, we are to look upon them as the products of various forms of fermentation, rather than as secretory products from the stomach cells.

Richet¹ has claimed that the hydrochloric acid of the gastric juice does not exist free, but in a state of loose combination with leucin, as chloride of leucin. His experiments are of value, since they furnish added proof that the gastric juice contains but one mineral acid; but few physiologists are inclined to believe that it exists combined with leucin. Certainly, for a vigorous gastric digestion, free acid is as indispensable as pepsin itself. Leucin is undoubtedly often present in natural gastric juice, and in extracts from the stomach mucosa, but I have many times also found considerable quantities of xanthin, hypoxanthin, and other similar crystalline extractives, and I see no reason for assuming a combination in the one case any more than in the other.

As to the strength of hydrochloric acid in the gastric juice, Richet, as the mean of seventy observations on a patient who had had gastrotomy performed for an impermeable stricture of the œsophagus, found 1.3-1.7 per mille. Other physiologists give somewhat higher results and 0.2 per cent. is usually taken as the average content of acid in active gastric juice. It can be easily shown, however, by experiment, that the strength of acid best fitted for digestion depends somewhat upon the amount of ferment present, and the character of the proteid to be digested. Using a pepsin extract of moderate strength and blood-fibrin as the proteid to be digested, we have found by quantitative trials that the most vigorous proteolytic action is usually obtained in the presence of 0.1 per cent. pure HCl. Thus, in one series of experiments where the amount of pepsin was the same throughout, with 0.05 per cent. HCl, 73.8 per cent. of the fibrin was dissolved; with 0.1 per cent. HCl, 89.3 per cent. of fibrin; with 0.2 per cent. HCl, 84 per cent. of the fibrin; with 0.3 per cent. acid, 81.7 per cent.; while with 0.4 per cent. HCl only 63.8 per cent. of the fibrin was dissolved. It is also to be remembered, that while the proteolytic action of the ferment is most vigorous in the presence of hydrochloric acid, other acids will, to a greater or less extent, take its place, viz., phosphoric, nitric, sulphuric, oxalic, acetic, lactic, etc. Thus, with oxalic acid, proteolytic action is vigorous in the presence of 0.5-2 per cent. of the acid; most

¹ Du suc gastrique chez l'homme et les animaux.

vigorous with 1.5 per cent., such a mixture dissolving about three-fourths as much proteid as the same amount of pepsin with 0.1 per cent. hydrochloric acid. With nitric acid, proteolytic action is most energetic in the presence of 0.2 per cent.; with sulphuric acid, in the presence of 0.3 per cent. Compared with 0.1 per cent. hydrochloric acid, nitric acid is more than four-fifths as active, while sulphuric acid is little more than one-fourth as active, and acetic acid is practically worthless. Hydrobromic and hydriodic acids can, to a certain extent, replace the hydrochloric acid of the gastric juice, as Putzeys¹ has previously found, although they are both much less active than the latter. Moreover, hydrobromic acid is much more efficient than hydriodic acid in connection with the ferment, for in comparatively large doses the latter will completely stop all proteolytic action. Whenever bromides and iodides are taken into the stomach, they are supposed to be decomposed by the acid of the gastric juice, with formation of hydrobromic and hydriodic acids, respectively, by which the retarding action of these two salts on gastric digestion is produced. Hence, as a practical result, the bromides and iodides should be given one-half to one hour before meals.

There are, I presume, many diseased conditions where imperfect digestion is due as much to the want of necessary acid as to lack of ferment. Thus in fevers, as a rule from whatever cause, a less active gastric juice is secreted than normally, one possessed of far less proteolytic action, though generally acid. The acidity, however, is frequently diminished and, as Ewald remarks, confirms the old habit of prescribing phosphoric or hydrochloric acid in fever mixtures. The simple fact that the stomach contents are acid does not necessarily indicate that the fluid is of the proper degree of acidity or even contains the proper acid suited to the ferment. Acetic, lactic, or butyric acid may be present and render the stomach juices decidedly acid, and yet it be necessary to give acid in order to bring the acidity up to the point suitable for the best action of the pepsin.

It is also possible to give an acid, as possibly salicylic, which will have a double action, viz., an antifermentative one and a digestion-promoting one. Certainly in many forms of dyspepsia, as the researches of Ewald have shown, the derangement originates in the absence of the required degree of acidity rather than in insufficiency of pepsin. In many such cases there may be an "acid stomach" and yet the secretion of normal gastric juice be practically suppressed, the acidity being due mainly to lactic acid doubtless formed by fermentation in the stomach; an acid which acts with pepsin only about one-sixth or one-eighth as well as hydrochloric

acid. Occasionally, as you know, the stomach contents have an alkaline reaction, as when a strongly alkaline transudation is poured into the stomach in connection with diminished or entirely abolished secretion of acid. Again, there are many other forms of dyspepsia or gastric troubles where there is a relative insufficiency of secretion, where pepsin as well as acid is wanting, and where artificial digestive preparations are especially called for.

With reference to the influence of drugs on the proteolytic action of pepsin-hydrochloric acid we have considerable definite information, partly as the result of experiments with artificial gastric juice and partly from observation on patients and animals with gastric fistula. Nearly all metallic salts diminish the proteolytic action of the ferment quite decidedly, even a few hundredths of a per cent. as a rule producing a noticeable effect. Thus cupric sulphate, lead acetate, mercuric chloride or corrosive sublimate, mercuric bromide, iodide and cyanide, salts of tin, zinc, manganese and iron, all have more or less of a retarding action on the digestive power of pepsin. Iron salts retard the action of the ferment much more than the corresponding salts of manganese. Mercurous chloride or calomel has been shown by Wassilieff to have no action whatever on the ferment. The action of these metallic salts is due, as a rule, to the combination of the metal with the proteid to be digested, forming an indigestible compound, and in part to a direct action on the ferment itself.

We have determined with all of these salts the exact amount of retardation or stimulation of peptic action under definite conditions, but I refrain from troubling you with the figures, especially as I think that the *extent* of action of a given amount of any drug in the stomach is, as a rule, greatly dependent upon the conditions, which are naturally variable, especially the strength of the pepsin-acid solution, the amount and character of the proteid to be digested, etc., and that it is better in applying these results to content ourselves with statements regarding the general nature of the action.

Arsenious acid has a noticeable stimulating or accelerating action on the ferment, the presence of even 0.5 per cent. of this substance causing the pepsin mixture to dissolve a much larger amount of albumen than the pepsin-acid alone will do. Arsenic acid has the same action, only still more pronounced, and the presence of even 2 per cent. of this compound leads to increased proteolytic action. This certainly accords with the generally accepted views as to the influence of arsenic on nutrition in general.

Potassium permanganate has a very energetic action on pepsin, the presence of even 0.005 per cent. in a digestive mixture reducing the action of the ferment to one-fourth the normal. Potassium cya-

¹ Jahresbericht der Thierchemie, 1877, p. 279.

nide and ferro-cyanide have marked inhibitory action on the ferment. Potassium chlorate and nitrate likewise retard the action of pepsin and when present to the extent of 1.5 per cent. both salts reduce the proteolytic action to one-fourth that of the normal ferment. Sodium tetraborate or borax and the chlorides of sodium, potassium, and ammonium all retard the digestive power of the ferment. Sodium chloride, in small amount, however, has a noticeable accelerating action. Potash and ammonium alum both retard digestive action. Sulphates of magnesia and soda likewise retard the action of pepsin, even 0.005 per cent. having a noticeable effect.

Nearly all of the alkaloid salts have more or less of a retarding action on pepsin; thus strychnine, brucine, veratrine, morphine, narcotine, quinine, cinchonine, and atropine sulphates all reduce the action of the ferment, morphine sulphate less than the others.

Bearing in mind that pepsin acts far less energetically with sulphuric and acetic acids than with nitric acid, and with the latter less actively than with hydrochloric, we can easily see that, as a rule, everything else being equal, sulphates will retard the digestive action of pepsin more than nitrates, and the latter more than chlorides, and if we are to apply such results as these to our practice it would be to use chlorides of the alkaloids, where practicable, rather than sulphates, and the same of inorganic salts. To be sure, after a short time, the alkaloid or its salts will have passed into the circulation and the stomach be freed from its influence, but it is well to heed the small things as well as the great, and if we can accomplish the same physiological effect with a chloride as with any other salt and thus avoid or lessen possible disturbance in the stomach it is perhaps as well to do so.

With alcohol we have a double effect to consider; the results of many experiments have shown plainly that the presence of alcohol impedes the proteolytic action of pepsin, even though it is present in comparatively small quantity; but as Gluzinski¹ has shown, alcohol rapidly disappears from the stomach, even 100 c.c. of 25 per cent. alcohol disappearing inside of fifteen minutes. While in the stomach, alcohol undoubtedly retards the solution of proteid matter. Schütz finds that 2 per cent. has a retarding action, while 10 per cent. causes a very great retardation, and 15 per cent. allows only a slight digestive action. Bikfalvi finds similar results, as do likewise Ogáta and Klikowicz. The disappearance of the alcohol, however, is followed by the secretion of an active, strongly acid gastric juice, which continues generally long after the food is entirely digested. Hence, under the influence of

alcohol, there is often an accumulation of large quantities of fluid in the stomach, frequently colored yellow by bile. With small quantities of alcohol, therefore, especially with an abundance of food, there is an undoubted stimulation of proteolytic action induced mainly, if not wholly, by the increased secretion of hydrochloric acid. Under such circumstances the first stage of retardation is hardly to be considered, since the alcohol disappears so rapidly. With large amounts of alcohol, the mechanical functions of the stomach are interfered with, and thus the food compelled to remain a much longer time in the stomach than normally.

Beer, wine, and stronger spirits all have retarding action, according to the experiments of Ogáta¹ on a dog with gastric fistula. In the case of beer, Ogáta found that the retarding action was due equally to the alcohol contained in it and to the extractive matters. Even sugar, both grape-sugar and cane-sugar, when taken in quantities above 10 grammes, tends to retard the digestive action of pepsin, but on account of its rapid absorption such action is, of course, only temporary. Soda water, or carbonic acid water, in quantities of 200 c.c. or more, moderately strong infusions of tea and coffee, and 200 to 300 c.c. of spring water, were all found to have no appreciable influence on gastric digestion in the stomach itself.

Sodium salicylate,² in doses of from 2.5 to 5 grammes, has a marked retarding influence on the digestive action of pepsin. Chloral hydrate, according to Klikowicz, is without action on pepsin, in doses up to 1 gramme. With 2 to 3 grammes, however, there is noticeable retardation of digestive action, which, with larger doses, becomes still more pronounced.

Among the newer drugs, antipyrin and antifebrin both retard the action of pepsin; antipyrin, when present to the extent of 3 per cent., almost entirely stopping the action of the ferment. Paraldehyde has a very pronounced stimulating effect when present in small quantity, and even 2 per cent. has only a slightly retarding effect. Urethan has a very slight inhibitory effect, while thallin tends to increase the digestive action of pepsin.

In contact with dilute sodium carbonate pepsin is very quickly destroyed, especially at the body temperature. Experiments made with scale pepsin and pepsin extracts from the stomachs of various animals, have shown plainly that destruction invariably takes place in the presence of 0.05 per cent. of the alkali carbonate; hence, when the acidity of the gastric juice is neutralized in the small intestine, and the mixture becomes alkaline, there will be a rapid destruction of the pepsin, aided, as Langley has found, by the trypsin of the pancreatic fluid.

¹ Jahresbericht der Thierchemie, 1886, p. 263.

¹ Archiv f. Hygiene, iii, p. 204.

² Klikowicz: Jahresbericht der Thierchemie, 1885, p. 277.

Trypsin, the proteolytic ferment of the pancreatic juice, acts freely only in neutral or alkaline fluids, slowly and imperfectly in feebly acid fluids. Thus, in an experiment on fibrin, a neutral solution of trypsin digested 77 per cent. of the proteid, while the same amount of ferment in the presence of 0.4 per cent. sodium carbonate digested 96 per cent. in the same length of time, and in the presence of 0.1 salicylic acid only 44 per cent. of the proteid. Under ordinary circumstances the ferment appears to act most energetically in the presence of 0.5 per cent. sodium carbonate, but it will act even in the presence of 5 per cent. of the alkali salt. In no case will a salicylic acid solution act as vigorously as a neutral solution of the ferment. It appears, however, that in the acid-reacting fluid, the ferment simply acts more slowly, and if time be given, will ultimately approach the action of the neutral fluid. In such cases, however, the salicylic acid is not free, but combined with the proteid matter; free acids, either mineral or organic, even a few thousandths of a per cent., completely stop the proteolytic action of trypsin, and the addition of dilute hydrochloric acid to a neutral trypsin solution will prevent all proteolytic action, even before the proteid matter is completely saturated; after which the acid quickly causes the death of the ferment. A glycerin extract of the pancreas, for example, on being warmed at the body temperature, with even 0.05 per cent. hydrochloric acid, soon loses its proteolytic action; and, as Langley has shown, the presence of pepsin aids in the destruction. Hence, it is obvious that pancreatic extracts or ferments given by mouth can be of no value whatever, since the proteolytic ferment at least will undoubtedly be destroyed in the stomach before reaching its normal sphere of action.

It seems to me very desirable, however, to be able to use the pancreatic ferments as an aid to pancreatic digestion in the small intestine. The use of such preparations, however, even though fortified by doses of sodium carbonate or bicarbonate, can avail little, since destruction must inevitably follow their entrance into the stomach. I have seen, however, proclaimed somewhere a form of capsule insoluble in dilute acid, but soluble in alkaline fluids, which if truly possessed of such properties could be made an easy means of introducing both the amylolytic and proteolytic ferments into that portion of the alimentary tract where they are capable of performing their characteristic functions. Without some such method of protection it is of course useless to administer trypsin by mouth with any hope of gain to the economy.

As you doubtless know, the action of trypsin is peculiar in that there is no swelling of the proteid matter as in the action of pepsin and acid, but the albuminous substance is eaten into, crumbles, falls apart, and then dissolves. Further, the action of

trypsin is peculiar in that it not only converts the albumen into peptone, but also decomposes a portion of the latter with formation of leucin, tyrosin and other products. With pancreatic digestion, the digestive function of the alimentary canal reaches its highest point, and, so far as proteolytic action is concerned, trypsin is undoubtedly more highly organized than its neighbor pepsin; the changes produced by it are more pronounced and deep-seated.

I would be glad to give you some idea of the relative activity of pepsin and trypsin as proteolytic ferments, but this I can hardly do with exactness. In normal digestion the two ferments work under such divergent conditions and the products of their action are so different, that it would perhaps be hardly correct to measure their relative action by the amount of albumen they are capable of dissolving. Again, so far as I am aware, attempts to obtain the pure ferments for pharmaceutical purposes have not as yet been as successful with trypsin as with pepsin. Looked at from the purely physiological standpoint, I am of the opinion, from my own experiments with the two ferments, that pure trypsin will prove to be more energetic in its action than pepsin, but the manufacturing chemists have yet to make a trypsin preparation equal in action to many of the brands of pepsin now in the market.

As a solvent of pseudo-membranes, as in diphtheria and in croup, the digestive ferments are certainly destined to prove of considerable value. Both pepsin and trypsin are recommended, but from a partial study of the various digestive ferments at present obtainable, I am inclined to consider pepsin as the most efficacious. If a trypsin preparation could be obtained in strength equal to many of the preparations of pepsin, I should be inclined to its use for the reason that it acts best in an alkaline medium, that it will eat into and disintegrate the fibrinous membrane rather than first cause it to swell up; that the alkaline secretions of the buccal and other glands will favor its action; that the alkaline fluids possible to introduce with the trypsin may have a slight solvent action in themselves on the diphtheritic membrane and that the ferment will act after the excess of alkali carbonate has disappeared.

These minor advantages, however, are, at present at least, far more than counterbalanced by the much greater activity of the ordinary pepsin preparations. Further, a large number of experiments to demonstrate the influence of various therapeutic agents on the proteolytic action of trypsin have shown me that, as a rule, this ferment is far more sensitive to the presence of foreign salts and drugs than pepsin is, and while this fact need not be considered here, yet it may influence us somewhat in favor of the latter ferment. Trypsin, however, is not much affected by the powerful oxidizing salt potassium chlorate, the presence of even five per cent. of this salt caus-

ing only a slight diminution in the solvent power of the ferment.

As we have seen, the solvent action of pepsin on proteid matter is most pronounced in the presence of 0.1-0.2 per cent. hydrochloric acid, but a thin solution of pepsin with this acid would very quickly rinse down when sprayed into the throat for the dissolving of pseudo-membranes. Admixture of glycerine will, in part, prevent this and keep the ferment for a longer time in contact with the surfaces to be dissolved. Obviously, the operation of painting or spraying must be frequently repeated, in order to keep the surface well moistened with the digestive fluid. Again, since pepsin will not act at all in a neutral or alkaline fluid, it is plainly better to have the digestive mixture at the outset contain at least 0.3-0.4 per cent. of actual hydrochloric acid. This will, in part, provide somewhat for the natural dilution of the acid, and also for the neutralizing action of the saliva and other fluids. Further, acid of this dilution is innocuous, and is a not unpleasant and cleansing mouth-wash. So long as the fibrinous tissue can be kept acid, the solvent power of the ferment will be exerted, and, in this connection, it is to be remembered that there exists a mutual attraction between the acid and the proteid matter of the membrane, by which the acid will be retained longer than by perfectly inert matter. It is to be remembered, however, that such dilute acid has a tendency to swell up proteid matter, and we can conceive of cases where such application might be deemed inexpedient.

The capability of pepsin for dissolving blood fibrin is very great, and at the body temperature its action is quite rapid, and hence one would expect that, under suitable conditions, the fibrinous portion of a diphtheritic membrane would be attacked with considerable rapidity.

The ferment solution, however, should be carefully brought to the body temperature prior to its introduction, and the ferment itself should be of the strongest kind, so as to favor immediate action. The widespread use of pepsin for this and other purposes has led to the manufacture of large numbers of preparations of this ferment, some of which, at least, are of doubtful quality. This fact has been impressed upon me many times in the laboratory, where, for various physiological purposes, commercial pepsin has been employed. Further, during the last six months I have made a comparative study of a number of the more prominent pepsins in the market, determining quantitatively their relative proteolytic action. The general use of pepsin as a remedial agent in gastric troubles may well make us solicitous as to the character and strength of the preparations at our disposal, but as a solvent for pseudo-membranes, where rapidity of action is of the utmost importance and the life of the patient

hinges on the result, we should be doubly sure of the character of the ferment employed. The methods at present suggested by the different pharmacopœias for testing the digestive strength of pepsin or pepsin solutions are somewhat variable, both in respect to the strength of acid employed, and in the character and condition of the proteid matter to be dissolved, and it may also be questioned whether the standard adopted is sufficiently high.

Nearly all of the methods now in vogue, either for pharmaceutical or physiological purposes, are based upon the older methods of Bidder and Schmidt, Ebstein and Grützner, and Gruenhagen,¹ and shorn of their details, consist essentially in a determination of the amount of coagulated egg-albumen or blood fibrin which can be dissolved by the ferment in a given time, an excess of proteid matter being present, and the amount of albumen dissolved being taken as a measure of the proteolytic action.

Such a method does indeed show which mixture or pepsin has the stronger digestive action, but does not give a very correct idea of the *relative* proteolytic power, for while the conditions in such an experiment or series of experiments appear to be the same in each case, they are in reality often very unlike. For, as Thompson,² in a recent article on comparative pepsin-testing, has well said, the amount of albumen in each test may be the same, and also the volume of the fluid and the amount of apparent ferment, and yet, as soon as digestion commences, the weaker pepsins quickly have more surface of albumen or fibrin to work upon than the stronger, and therefore show better than they should. Again, all who are familiar with pepsin-testing can easily see that the condition of the proteid matter to be acted upon becomes a very important factor in such a test. Whether blood fibrin or hard-boiled egg, the fineness of its division, the completeness of its coagulation, the thoroughness with which it is kept suspended in the digestive fluid, all tend to exercise a very important influence on the final result, and are necessarily a source of frequent error.

Still again, the strength of acid recommended by several of the pharmacopœias is such as to be at least suggestive of the formation of considerable acid albumen, by which the apparent strength of the ferment is correspondingly increased. To obviate these difficulties, and, if possible, to insure more accurate results in pepsin-testing, I have devised the following method, based upon the fact that fluid egg-albumen is essentially of the same degree of digestibility as coagulated albumen,³ and that the ability to form albumose and peptone is possibly a more accu-

¹ See Hermann's Handbuch der Physiologie, Band 5, 2d Theil, pp. 75-77.

² The Druggists' Bulletin, vol. ii. p. 261.

³ Wawrinski, Hermann's Handbuch der Physiologie, Band v., 2d Theil, p. 83.

rate measure of proteolytic action than the power of simply dissolving coagulated proteids.

The albumen solution is prepared after the manner recommended by Schütz.¹ A quantity of the undiluted white of egg is freed from globulin by the addition of hydrochloric acid of specific gravity 1.12, 4.2 c.c. to 300 c.c. of albumen, shaken gently and after standing some hours filtered. The fluid will then be found to have lost its viscosity, and to be perfectly clear. The acid will likewise have neutralized the alkali carbonate present, and converted the phosphates into acid salts. The solution, however, will not contain any free acid. 10 c.c. contain approximately one gramme of dry albumen; the exact amount can be determined in a sample by coagulation. The solution can be kept for some days, and so used in a large number of experiments.

The testing is conducted as follows; 10 or 20 c.c. of the albumen solution are measured out with a pipette and introduced into a suitable receptacle, a definite volume of pepsin solution, say 50 c.c., previously prepared by dissolving a weighed amount of the pepsin² in 0.2 per cent. hydrochloric acid, is added, and enough more 0.2 per cent. acid to make the entire mixture 100 c.c. The fluids are then placed in a bath at 40° C., and allowed to remain there for five or six hours.³ No stirring is needed, no attention of any kind, other than to keep the mixture at the proper temperature, and there is no possible error from variations in the mechanical condition of the proteid. At the end of the allotted time, the mixtures are heated to boiling and the acid neutralized by addition of the equivalent amount of sodium carbonate, best in approximately a one per cent. solution. The unaltered albumen, as acid albumen, is at once thrown down as a heavy flocculent precipitate, and while still hot it is at once collected on a dried, weighed filter, washed thoroughly with boiling water, and dried at 110° C. From this is easily calculated the amount of albumen converted into soluble products under the conditions of the experiment, from which in turn can be calculated the relative proteolytic action of the pepsin tested. The figures so obtained, if the conditions have been properly arranged, give a much closer approach to the true proteolytic power of a ferment than any similar method with solid proteids, but even this does not tell the whole truth. There is still felt the influence already mentioned of the relative excess of unchanged albumen in those digestions where the ferment action is weakest, and hence, after having used the above method as a preliminary test, it is

necessary to have recourse to a modification of the principle made use of by Brücke¹ years ago, and recently recommended by Thompson, of using sufficient of each pepsin or pepsin solution to convert the *same percentage* of albumen into soluble products. In this way only, so far as I am aware, can the true proteolytic power of a pepsin or pepsin extract be determined.

After these methods I have tested the following brands of pepsin, obtaining as a preliminary result the following figures expressive of their relative proteolytic action.

The "pepsinum purum in lamellis" having the highest digestive power, is taken as the standard (100).

	Preliminary test of relative proteolytic action.
1. Parke, Davis & Co.'s pepsinum purum in lamellis	100
2. Fairchild's pepsin in scale	73
3. Scheffer's dry pepsin, concentrated	70
4. Jensen's crystal pepsin	56
5. Ford's pepsin in scales	54
6. North's pure pepsin	36
7. Boudault's pepsin	35
8. Royal Chemical Co.'s pure pepsin	27
9. Scheffer's saccharated pepsin	16
10. E. Merck's pepsin germ. pur. pulv.	11
11. Lehn & Fink's powdered pure pepsin	0

From these data, which are the average of many results, we might infer that Fairchild's pepsin, for example, contains three-fourths as much active ferment as the pepsinum purum of Parke, Davis & Co., and that Ford's and Jensen's pepsins contain approximately half as much true ferment as the pepsinum purum. Such a conclusion, however, would be fallacious, and to obtain the true measure of proteolytic action we must proceed further and determine next the relative amounts of the different preparations needed to produce a like result in each case. After this method we find, for example, that it requires about twice as much of Fairchild's and Scheffer's pepsin to form a given percentage of peptone as of the pepsinum purum, and that of Ford's and Jensen's preparations about three times as much, thus showing that the true difference in proteolytic power is considerably greater than the preliminary results alone indicate. As a final result, then, we may consider the true proteolytic power of the above ferments, compared with the one of highest digestive power, to be as follows:

	Relative, proteolytic action.
1. Parke, Davis & Co.'s pepsinum purum in lamellis	100
2. Fairchild's pepsin, in scales	52
3. Scheffer's dry pepsin, concentrated	48
4. Jensen's crystal pepsin	35
5. Ford's pepsin, in scales	32
6. North's pure pepsin	16
7. Boudault's pepsin	14
8. Royal Chemical Co.'s pure pepsin	9

¹ Zeitschrift für physiologische chemie, Band ix. p. 581.

² 50-500 milligrammes of the pepsin in 1 litre of the acid, according to its proteolytic power.

³ The conditions to be so arranged as not to have more than 50-60 per cent. of the albumen, at the most, converted into soluble products.

¹ Vorlesungen über Physiologie, p. 303.

In considering these results it is to be borne in mind that the same brand of pepsin is liable to slight variations in digestive power, doubtless dependent, in part, upon the condition of the membranes from which it is prepared. Thus, in several instances I have found one or two of nearly the same digestive strength, changing their relative positions, notably Nos. 2 and 3 and Nos. 4 and 5.

As to the actual strength of these preparations, 1 milligramme of the strongest pepsin converted into soluble products 198 milligrammes of the pure dry albumen, which would be practically equal to 2000 parts of fluid egg-albumen.

THE USE OF BARIUM CHLORIDE IN HEART DISEASE.

BY H. A. HARE, M.D.,

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ONE of the most recent and one of the best evidences of the value of the study of the action of drugs upon the lower animals is given us by this substance. It will be remembered that Brunton and Ringer, of London, and Kobert and Bary, of Dorpat, have, at various times, published during the last few years their studies concerning the effect of barium on the circulatory apparatus of the frog and dog, and that all of them are in accord in the statement that it slows the heart very greatly, steadies its rhythm, and, at the same time increases the volume of blood thrown out of the ventricle. They have also found that barium increases blood pressure, and Kobert has, by a series of careful experiments, concluded that it brings about this change by an action on the muscular coats of the bloodvessels.

If large doses are used in the lower animals, the heart suffers systolic arrest from over-stimulation, and the strongest irritation of the vagus nerves fails to relax the systolic contraction. Still more interesting is the statement that this failure of the vagi to inhibit the heart is not the result of paralysis of these nerves, but is simply due to the excess of cardiac contractile power. The slowing of the pulse is not due to inhibitory influence, but depends solely upon the stimulation of the heart muscle, although it would seem probable that the vaso-motor stimulation, by increasing the arterial resistance, may be, at least, a factor in the reduction of the pulse-rate. At one time, in the dog after large doses there is a period of increase of pulse-rate which is asserted to be due to stimulation of the accelerator nerves.

With this brief statement of the influence of barium upon the normal animal I wish to detail the results which I have reached in the employment of this salt in cardiac disease in man, and I also desire

to thank Dr. E. T. Bruen for the opportunity of testing its action in several interesting cases at the German Hospital and to record my obligation to Drs. Steltz and Shurtleff, the resident physicians, for their kindness in keeping a record of the cases.

The first case which I shall detail occurred in my own practice, and was as follows:

CASE I.—A. W., æt. six, girl, has had for some months marked dyspnoea at night and some shortness of breath during the day. She has a history of rheumatism of a mild type, and her maternal grandmother is virtually bedridden with the disease, which is, in her case, of a purely arthritic nature.

The child is fairly well developed for her age, but has the typical dilated nostril and rapid respiration of cardiac trouble. There is no cough. Examination shows a loud mitral systolic murmur which is quite faint over the apex and increases greatly in volume as the ear follows it to the left axilla, while at the angle of the left scapula the murmur is remarkably loud. There has been no dropsy at any time.

Although, so far as I am aware, barium has not been tried in cardiac disease in children I ordered half a drachm of a solution of the strength of one part of barium to 100 parts of water to be given three times a day. From the first, the condition of the child at night was markedly improved, the dyspnoea was much less and the sleep not so restless. The pulse, which had been at 130 per minute, now remained at 80 when quiet, or 100 after exercise, and the area of the thrill over the apex was much less diffused than before. One of the chief evidences of improvement was the absence of that peculiar whirring, tumbling sound, so characteristic of such cases, the murmurs becoming well separated from one another and having a much more definite character.

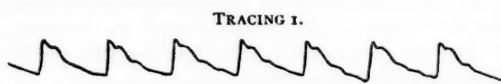
The continued use of the barium in this case for over two weeks has caused no untoward symptoms, and the child has steadily improved, notwithstanding an attack of mild bronchitis in the meantime.

CASE II.—A man, æt. about thirty-five, was admitted to the German Hospital, suffering from acute dilatation of the heart, the result of suddenly lifting a very heavy beer barrel. His pulse was weak and irregular, and he frequently suffered from attacks of pain closely resembling angina pectoris, with marked expression of anguish. The use of barium chloride in the dose of a teaspoonful of a one per cent. solution relieved him markedly, increased the volume and force of the pulse wave and slowed it to as low a rate as 60 or even 58 per minute.

CASE III. was a man of about fifty, with a double aortic regurgitant murmur, complicated by Bright's disease of a benign type, in so far as the renal signs were concerned. There was some pain over the region of the heart. Under the influence of the barium, in drachm dose of the standard solution, the pulse became much slower and far more forcible.

I offer the following sphygmographic tracing for the purpose of showing what an atypical pulse was brought about by the barium in this case.

While the sphygmograph is virtually useless for most purposes, aortic regurgitation is a lesion which it is generally quick to record.

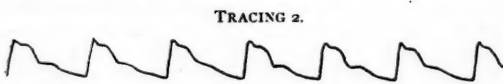


Sphygmographic tracing showing absence of Corrigan pulse in a case of aortic regurgitant and obstructive murmur. Note the sharpness of the upstroke and the lack of sudden fall so commonly seen in such cases.¹

So far as we were able to discover, the barium caused no renal disturbance and the man expressed himself as very much improved.

CASE IV.—A colored man, æt. about fifty, suffering from aortic regurgitation, producing a very loud murmur, was placed upon the dose always employed by me in these studies. The pulse rapidly became more full and strong, and the comfort of the man was considerably increased.

The following tracing, taken from Case IV., shows much the same characteristics as does Tracing 1, the upward stroke being equally sharp, while the prolongation of the pulse wave is seen to be particularly well marked.



CASE V.—Adult, male, with a well-marked mitral regurgitant murmur. The pulse rapidly became slower and the beat more rhythmical under barium chloride. Before the drug was used the morning pulse-rate ranged from 108 to 92, while after the first dose the pulse went down to 72, and remained between this point and 60, until he was discharged from the house.

CASES VI. and VII. consist of two men who suffered from marked weakening and diminution of the pulse wave, and of irregular and excitable heart respectively. In other words, no lesion could be discovered, save that of functional disorder. In both men barium chloride brought about a very rapid improvement in the cardiac state.

A point which seemed to me worthy of the remark was the character of the pulse wave produced. While its volume is increased it does not give that sensation of tenseness to the finger that does digitalis, and the pulse wave seems to be very considerably prolonged; a fact that the sphygmograph also records.

In most of the works on chemistry barium is stated to be an irritant poison, but to produce

¹ I am well aware that in some cases of slight aortic regurgitation exercise only will develop the Corrigan pulse. This case, however, had very typical signs of an advanced lesion.

such evidences of its presence the dose given must be extremely large and many times greater than any amount useful for practical medicinal use.

What the verdict of the profession as to the general effects of barium upon cardiac disease will be, time alone will tell, but it is worthy of remark that in this substance we seem to possess a remarkably cheap, virtually tasteless, and very slightly poisonous drug, which, nevertheless, acts as rapidly as digitalis, and does not disorder the stomach.

MEDICAL PROGRESS.

Antiseptic Measures Adopted at the New York Eye and Ear Infirmary.—DR. W. F. MITTENDORF gives an account of some of the antiseptic measures adopted at the New York Eye and Ear Infirmary, Thirteenth Street and Second Avenue, which is as follows:

Of the different drugs employed, alcohol, corrosive sublimate, carbolic and boric acids are the principal ones.

Large bottles containing solutions of these chemicals are kept constantly on hand in the operating room. The solutions of corrosive sublimate vary in strength from 1 to 500 to 1:5000. The stronger preparations are usually employed to cleanse the operators' hands; the solutions of 1:2000 or 1:3000 are employed where an inflamed condition of the conjunctiva calls for greater precautionary measures, and the weaker solutions are freely used in cleansing the conjunctival sac both before and after operating in ordinary cases. Unfortunately, the irritating effect of the bichloride of mercury solutions upon the conjunctiva, and at times on the cornea itself, makes the use of this best of all antiseptics rather dangerous at times.

It soon became apparent after its use, in changing the bandage for the first time after cataract extractions, that, although the conjunctiva had been perfectly normal at the time of the operation, the eyes had an angry red appearance, due to injection of the conjunctival vessels, and not infrequently even a mucoid discharge was observed at these times, offering an inviting surface for germs that might be floating in the air and get into the eye at the time of changing and dressing. These facts, and the greater freedom with which milder, non-irritating solutions of other remedies may be used, have led most of the operators to use solutions of boric acid varying in strength from ten to twenty grains per ounce instead.

Carbolic acid is used principally for the cleansing of instruments and the disinfecting of sponges, although very few surgeons employ the latter, pledgets of absorbent cotton soaked in weak solutions of corrosive sublimate or boric acid being almost entirely used at present. Catgut is likewise preserved in carbolic acid. Absolute alcohol is used to immerse the instruments in before the operation, and biniodide of mercury in solution of 1:25000, although it enjoyed a great reputation, has only a very limited use at present; it being principally employed to cleanse the anterior chamber of blood and lens particles. Resorcin is very rarely employed by any of the operators.

Heat, dry as well as moist, is at times used for the cleansing of instruments that will not be injured by it,

for instance, those that are used for the removal of foreign bodies from the eye.

For minor operations the eye is washed out with a boric acid solution, applied freely by means of a soft rubber syringe. The operator and the assistants having washed their hands in a solution of corrosive sublimate, the instruments, which have been lying in alcohol for several minutes, are handed to him on a porcelain tray which had been cleansed in a solution of carbolic acid or corrosive sublimate. As soon as the operation is completed and the wound cleansed, the eye is washed again with an antiseptic solution and bandaged, if necessary, by placing over the thin layer of linen which goes next to the eye a sufficient quantity of cotton that had been previously moistened with an antiseptic solution, over this a layer of absorbent cotton, and over this the roller bandage is placed. In major operations, the eyelids and brows are washed with a solution of corrosive sublimate 1:2000, and the conjunctival sac is cleansed by washing it with a solution of either boric acid or corrosive sublimate, and some surgeons prefer to have this done several times before the operation in cases where there is a suspicious discharge from the conjunctiva or the tear passages. For this purpose a very much diluted Labarraque's solution of hypochloride of sodium is sometimes employed. Blood from the anterior chamber is usually removed by syringing the eyeball freely with Pannas's or a boric acid solution. The floor of the operating room is of hard wood, and the operating tables, as well as everything connected with the room, are kept scrupulously clean, a condition that should never be lost sight of, as a failure in this respect might counteract aseptic as well as antiseptic measures.—*International Journal of Surgery*, Jan. 1889.

Creasote in Tuberculosis and Catarrhal Affections.—DR. SEITZ, of Heidelberg, finds that, for tuberculosis and chronic catarrhal affections, creasote is best administered when mixed with cod-liver oil, as in the following:

R.—Creasote	38 grains.
Cod-liver oil	3 viiss.
Saccharin	2 grains.—M.

Sig. One to four teaspoonfuls once, twice, or three times daily. For children, smaller doses should be given.—*Therapeutische Monatshefte*, Jan. 1889.

A New Locality for Trephining the Mastoid Process.—DR. MITZKUNA proposes a new locality for trephining the mastoid process; the point of trephining to be found thus: The ear is drawn forward, whereby a fold (of the skin) is formed just behind the ear; under this fold a flat, bony prominence is felt; between this prominence and the base of the mastoid process is a depression, which depression is the place for trephining. The advantages of this locality over others are:

1. That a chisel can descend from one-fourth to one-third of an inch with safety.
2. That the transverse sinus, which takes a different course in different people, never touches this point.
3. That the thickness of the temporal bone is greatest at this point.
4. The only drawback of this locality is the possibility of going through the external auditory canal, but

even this is nothing when compared to the possibility and danger of injuring the transverse sinus.—*Wiener klin. Wochenschrift*, January 17, 1889.

A Rare Cause of Dilatation of the Stomach.—DR. OTTO PERTIK, of Buda-Pesth, describes and figures (*Virch. Arch.*, cxiv. 3) a singular abnormality, causing obstruction to the onward passage of the contents of the stomach, and leading thereby to great dilatation of the viscus. The defect consisted in a curious pouch of mucous membrane, shaped like the finger of a glove, about eight centimetres in length and three centimetres wide, which projected into the duodenum, with the upper part of which the posterior wall of the pouch was continuous. This first part of the duodenum was much dilated, and its mucous membrane quite smooth, passing continuously into the mucous membrane which formed the internal as well as the external coat of the abnormal pouch. The mouth of the pouch thus looked upward, and anteriorly it had a free lip or margin, close to which the common bile duct opened, suggesting the possibility of the formation of the pouch in an abnormality of the fold of mucous membrane that occurs at the orifice of the duct. But there was no evidence of gall-stone or any other cause which could have produced it. The probability is that the pouch was formed from one of the valvulæ conniventes, although the precise mechanism of its production is obscure. The entire absence of the folds from the dilated duodenum above the pouch may doubtless be ascribed to the distention which this portion of gut underwent in common with the stomach. In introducing the subject, Dr. Petrik makes some general remarks upon the etiology of gastric dilatation. Exclusive of congenital strictures of the pylorus, etc., he points out that the diminished power of the stomach to expel its contents may be brought about by: 1. Obstruction at the outlet—as from cicatricial or malignant strictures, hypertrophy of the muscularis or mucosa at the pylorus, polypi or tumors in the pyloric region, or external pressure on this part by tumors in the vicinity. 2. An actual loss of muscular power in the stomach, without any obstruction—as following on chronic catarrh, extensive ulceration, carcinomatous infiltration, peritonic adhesions; and general conditions leading to loss of tone—as anæmia, typhoid fever, phthisis, etc. 3. An excessive amount of contents, as has been observed in the polyphagous, diabetics, and vegetarians; so that the pyloric orifice becomes relatively too small for the ready passage of the bulky gastric contents. The curious case related above falls, of course, under the first head, but the obstruction was in the duodenum, and not at the pylorus.—*Lancet*, Jan. 19, 1889.

Therapeutic Uses of Salicylate of Mercury.—DR. PULMERT (*Vierteljahressch. f. Dermat. und Syphilis*, Heft 5, 1888), in his researches with salicylate of mercury, used the preparation from the factory of F. Heyden's successor, of Radebeul, near Dresden. It is a white amorphous powder, odorless and tasteless, of neutral reaction, and insoluble in water and alcohol.

To obtain a solution, the author mixed 10 parts of the salicylate of mercury with 15 to 20 parts of chloride of sodium dissolved in water; to this in turn were added 200 parts of water, and a solution obtained by heating the whole over a water-bath. The solution was then diluted

with 3000 parts of water, in which state of dilution the mercury would not separate. The prescriptions used were as follows:

For gonorrhœa:

R.—Salicylate of mercury	}	āā 1 to 3 parts.
Carbonate of potassium		
Water		1000 parts.

For external applications:

R.—Salicylate of mercury	}	āā 1 part.
Carbonate of potassium		
Water		100 parts.

As a salve:

R.—Salicylate of mercury	1 part.
Vaseline	30 parts.

As a sprinkling powder:

R.—Salicylate of mercury	1 part.
Carbonate of magnesium	20 parts.

For subcutaneous injections:

R.—Salicylate of mercury	}	āā 1 part.
Carbonate of potassium		
Water		100 parts.

Internally:

R.—Salicylate of mercury	40 grains.
Powder and extract of calamus, of each sufficient to make 1000 pills.	

The results obtained with this preparation in the treatment of gonorrhœa were not as satisfactory as anticipated, the duration of the disease not being shortened by its employment.

Venereal and syphilitic ulcerations were covered with cotton which had been dipped in the one per cent. solution. (To avoid all possible eczema the cotton was not thoroughly saturated.) After two or three days the ulcers took on a healthy appearance, and healed rapidly. Syphilis proper was treated with subcutaneous injections of this preparation, which was used in proportions of 1:100. The injection fluid was always freshly prepared before each injection, special care being taken that the same was colorless, and without any deposit, sixteen minims were then deeply injected into the connective tissue. At first the patients would not complain of pain; after the lapse of a few minutes a slight burning sensation made itself felt, which lasted from one-half to two hours. Abscesses, the result of the injections, were never observed. Stomatitis was only observed in one case, and that was after the thirtieth injection had been made. Internally, the preparation was given in pill form. Digestive disturbances were not observed, while the results obtained gave great satisfaction.—*Centralbl. f. d. ges. Therapie*, Jan. 1889.

For Hæmoptysis.—

R.—Ergotine (Bonjeau)	30 to 60 grains.
Gallic acid	8 grains.
Mint water	ʒiij.
Syrup of oil of turpentine (Fr. Ph.)	ʒj.—M.

This potion to be administered in teaspoonful doses in the twenty-four hours.—*L'Union Médicale*, Jan. 5, 1889.

Splenectomy in Spain.—DR. MAS, of Valencia, has performed splenectomy with an entirely successful result. This is the second time that the spleen has been extirpated in Spain, one other case having been done by Dr. Ribera Sans. Dr. Más's patient was a married woman who had had children. For some years she had noticed a tumor in the left loin the size of an egg, but after her last confinement this increased in size and caused a great deal of distress. On examination, a large smooth mass, giving the impression of containing liquid, and dull on percussion, could be made out in the left hypochondrium, the usual splenic dulness being absent. An exploratory puncture was made, and a clear, non-albuminous liquid obtained, which when examined proved to be of hydatid origin. The question then arose as to the organ in which it was seated. By a process of exclusion, the spleen was fixed upon as the affected organ, and it was also made out that it was both hypertrophied and out of place. The patient was extremely anxious that something should be done, and Dr. Más, knowing the danger of leaving such a tumor without interference, decided on performing splenectomy, having first satisfied himself that there was no leukæmia. He mentions that he was so affected by the preparations made for this important operation, and by the sight of the assistants who were to help him, that he almost fainted, and so, of course, was in no condition to operate at the time appointed. Three days later, however, he went to the house alone, gave the woman chloroform, lifted her on to a table, and extirpated the spleen, with a hydatid tumor as large as the foetal head at term, without any skilled assistance. The wound was dressed antiseptically, and the patient made an excellent recovery, returning to show herself in 'first-rate health seven months afterward. The blood was examined at the time of recovery, and was found to show no signs of leukæmia.—*Lancet*, Jan. 19, 1889.

The Physician's Care of his Hands.—DR. GEORGE MEYER, of Berlin, writes (*Berliner klin. med. Woch.*, Jan. 14, 1889) that in these days when the physician is compelled to wash his hands frequently with disinfectants, they soon get into a deplorable condition. Redness, eczema, and small abrasions of the skin, the consequences of the frequent washing and brushing with antiseptics, are at times so annoying that in order to gain relief, temporary abstinence from the use of antiseptics seems the only remedy. Many methods have been resorted to, to render the hands soft and smooth; but one special method recommended to the author by Professor Liebreich seems especially worth mentioning.

After having washed the hands with soap, and thoroughly dried them, apply a small amount of lanolin; rub this over the entire hand, and remove any surplus with a dry towel. A small amount of perfume will render the preparation more acceptable. Thus, the following is very good:

R.—Lanolin	500 parts.
Vanilla	1 part.
Oil of roses	2 parts.—M.

Or,

R.—Lanolin	1000 parts.
Liquid paraffin	250 "
Vanilla	1 part.
Oil of roses	2 parts.—M.

For the busy practitioner, such an ointment put up in metal capsules, like oil-paints, would be very useful. The author states that for years he suffered from lobster-red hands, which chapped as soon as the cold weather set in. Since using lanolin his hands have become white and smooth. He has recommended this remedy with similar benefit to actresses whose faces suffered from the application of cosmetics.

The *Archives de pharmacie* gives the following formula for lanolin cream :

R.—Lanolin	5 parts.
Sweet oil of almonds	5 "
Precipitated sulphur	5 "
Oxide of zinc	2½ "
Extract of violets	5 "
Extract of alkanna } (to give a rose color) }	9½ " M.

Pregnancy and Operative Surgery : their Mutual Relations.

—DR. LOUIS McLANE TIFFANY, of Baltimore, in an article upon this subject, reaches the following conclusions :

1. Pregnancy is a physiological condition and does not contraindicate a surgical operation.
2. During pregnancy temporary strain may be exerted on some organ, *e.g.*, kidney, inducing impairment of function.
3. A surgical operation upon a pregnant woman is to be conducted so as to avoid inducing abortion, in itself a serious accident.
4. The main cause of abortion, or death after operation is sepsis.
5. The probability of sepsis after operation is increased if the patient is suffering from disease either temporary or permanent.
6. Abortion may result from shock.
7. Hemorrhage does not seem to induce abortion.
8. Union of fracture may be retarded by pregnancy.
9. Recorded cases show that the unborn child receives no evil impress when the mother is subjected to operation.
10. When a surgical operation upon a pregnant woman is under consideration, the function of all the patient's organs must be carefully investigated and regulated. An operation then conducted antiseptically may be expected to result as though pregnancy were not present.—*Maryland Med. Journal*, Jan. 26, 1889.

Local Treatment of Diphtheria with Salicylic Acid.—DR. A. D'ESPINE, in a paper upon this subject, concluded as follows :

1st. From the experiments made it is safe to say that salicylic acid, already in dilutions of 1 : 2000, is an excellent parasiticide of the bacillus of diphtheria.

2d. Its entire harmlessness in such doses permits its being used without fear, which cannot be said of carbolic acid or sublimate. Irrigations of salicylic acid should also be used as a prophylactic remedy in diphtheria, in all simple throat affections, which in time of an epidemic might be the means of receiving the bacillus of Löffler. This treatment should be especially applied to all scarlatinal sore throats, which, owing to the streptococcus of Heubner, might easily become the seat of necrotic pharyngitis or true diphtheria.

The author only claims originality for the large quantities of liquid used in the irrigations, which are repeated hourly until an improvement in the existing conditions is observed. It is evident that salicylic acid cannot prevent any accidents which are the outcome of an enfeebled constitution ; hence the necessity of an early diagnosis of diphtheria becomes the more apparent.—*Revue médicale de la Suisse normande*, Jan. 20, 1889.

Action of Sulphonal.—At the clinic of PROFESSOR MEYNER, at Vienna, sulphonal was administered to forty patients in 230 doses ; the results obtained were good in 64.5 per cent. (that is, they obtained from six to eight hours' sleep), less good in 14.5 per cent. (sleep being frequently interrupted), and bad in 20.9 per cent. (little or no sleep being obtained). As a rule, the patient fell asleep from one-half to two hours after the preparation had been administered ; evil after-effects, with the exception of an occasional headache, or a slight dizziness on awaking, were not observed.—*Wiener klin. Wochenschrift*, No. 2

Treatment of Migraine.—

R.—Sulphate of quinine	gr. vj.
Crystallized salicylate of soda	" vj.
Chlorhydrate of morphia	" ¼.—M.

For one powder.

Administer one powder every hour until four have been taken ; then immediately after the last powder administer $\frac{1}{16}$ of a grain of aconitia. Generally from one-half to one hour from the beginning of this treatment the paroxysm will disappear.—*L'Abeille médicale*, Jan. 21, 1889

Treatment of Eczema of the Genital Organs.—

R.—Oleate of cocaine	gr. 7 to 15.
Olive oil	3ss.
Lanolin	3ijss.—M

Apply twice daily.

—*Deutsche med. Wochenschrift*, Jan. 17, 1889.

Inoculation of Syphilis by Tattooing.—SURGEON F. R. BARKER reports that out of fifteen soldiers tattooed by one man eleven contracted syphilis. The men were tattooed at various dates during the year 1888, and the periods of incubation varied from eighty-seven to thirteen days. The operator was examined and found to have mucous tubercles in his mouth, a coppery rash on the chest, a scar on the penis, enlarged glands, etc. He admitted that he had mixed his colors with saliva and had also put the tattooing needles in his mouth.—*London Medical Recorder*, January 21, 1889.

Ingluvlin in the Vomiting of Pregnancy.—DR. POPP (*Pester med. Presse*, No. 40, 1888) reports having achieved considerable success with ingluvin in the vomiting of pregnancy. Having a very obstinate case, upon which he had exhausted the entire resources of the pharmacopœia, he administered three times daily, one-half hour before mealtime, eight grains of ingluvin, and directly afterward two tablespoonfuls of a one per cent. hydrochloric acid solution. An improvement was observed after a few doses had been taken, and a cure effected after the treatment had been continued for three weeks.—*Deutsche med. Wochenschrift*, Jan. 17, 1889.

THE MEDICAL NEWS.

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SATURDAY, FEBRUARY 16, 1889.

TUBERCULOUS MEAT AND MILK.

THE College of Physicians of Philadelphia, at its meeting held last week, discussed the subject of tuberculous meat and milk in their relations to the public health. The subject was introduced by Dr. George Strawbridge, who, in a paper containing a great array of statistics collected in Europe and in the United States, showed that tuberculosis is a common disease in cattle, especially in high-bred cows, and that under certain conditions it may be communicated to man by consuming the flesh and milk of animals suffering from this disorder. These facts, which are of universal importance, coupled with the discovery that no official inspection of meats and a very limited inspection of milk have ever been conducted in Philadelphia, should arouse intense popular interest in behalf of measures of protection against an apparently formidable source of a disease which is amongst the worst scourges of the human race.

It was the purpose of the lecturer to elicit, by a thorough discussion, the deliberate opinion of the College on this subject in the form of propositions which would serve as the basis for necessary legislation. These propositions were referred to a committee to report upon at the next stated meeting, when final action is expected to be taken.

The Congress on Tuberculosis of Man and Animals, held in Paris, July 25 to 31, 1888, the deliberations of which were fully reported at the time in

THE NEWS, was perhaps the most important convention of the kind ever held. The conclusions adopted were accepted as definite and authoritative by the French government, which immediately adopted regulations to be enforced for the prevention of the transmission of tuberculosis from animals of the bovine species. Cattle are to be placed under the supervision of sanitary veterinary surgeons, and whenever found to be tuberculous are to be isolated and sequestered, and when destroyed, the killing must be done in the presence of the officer. Meats from tubercular animals must be destroyed when the disease has become generalized, and also when the lesions are localized, if they have invaded the greater part of an organ, or appear in the form of eruptions on the chest-walls, or abdominal cavity. The sale and use of milk from tubercular cows is forbidden, though when boiled it may be used on the spot for feeding animals.

Dr. Strawbridge produced letters from veterinary experts and statistics which enabled him to state, that at least two per cent. of the animals of the bovine species in Pennsylvania are tuberculous. No official measures have ever been taken for preventing the sale and use of the meat and milk of such animals which are capable, under certain conditions, of communicating the disease to man. The danger of infection may be averted by thoroughly cooking these articles of food, but it requires a temperature of at least 185° F. to render them innocuous. Underdone meat is not heated beyond 122° or 140° F., and the practice of boiling milk is not the most common.

The danger having been pointed out, the next step is to determine upon the best measures of prophylaxis. Nothing should be left to haphazard. The radical measures adopted by the French government are based upon well-ascertained facts, and would seem to meet the indications most completely.

This subject suggests a reference to the broad question of animal sanitation in its relations to the public health. It is a well-known fact that domestic animals are subject to numerous contagious and infectious diseases, some of which are intercommunicable between animals, whilst others are communicable to man. These diseases have at times proved very destructive, causing immense agricultural and financial losses to the country. The vast importance of a speedy extinction of these plagues has been recognized, and measures have been taken by the general government and by State authorities for

accomplishing this object, but these have been primarily adopted for the protection of agriculture. With some notable exceptions, no legislation has been adopted with the avowed purpose of protecting the public health. The meat from diseased animals is constantly exposed for sale in our markets, and statistics are not wanting to prove that the flesh and milk of diseased cattle are dangerous as food for human beings.

Professor Law states that malignant or contagious anthrax in cattle and sheep has become increasingly frequent throughout most of the United States in the past few years. The disease known as malignant pustule in man is acquired by consuming the flesh and milk of cattle thus affected. The resting spores of the bacillus anthracis may survive 300° F., and therefore ordinary cooking does not destroy their virulence.

Epidemic pleuro-pneumonia is also a common disease. Whilst doubt has been expressed as to the effect of this disease upon the meat, Gamgee and other excellent authorities affirm that the flesh of cattle thus affected produces disease in man.

The parasitic diseases of animals are not uncommon. The trichina in pork, the cysticercus cellulose in pork which produces the tænia solium in man, the cysticercus in cattle which produces the tænia mediocanellata in man, the cysticercus in sheep, the echinococcus in cattle derived from the tænia echinococcus in the dog, and communicated to man, and the rot in sheep, or fluke disease, caused by the distoma, are sources of infection which should be guarded against.

The milk, butter, and cheese from cows suffering with the foot-and-mouth disease may communicate the disease to man.

Facts and authorities might be stated to show how common is the existence of dangerous communicable diseases among animals, and that many of these affections can be transmitted to man, either by accidental inoculation or by consuming the diseased flesh and milk. It is time that concerted action should be taken for the protection of the public health against these sources of injury, as well as for husbanding the agricultural resources of the country. Local and State action is only of limited benefit. The subject is of so momentous a character as to demand the intervention of the national government, and it would appear to be a wise course to delegate the control of animal sanitation, especially the animal contagia and parasites which affect man

as well, to a national board of health clothed with ample authority to investigate these diseases and apply measures for their restriction or extinction.

SOZOIODOL.

THIS substance differs in one respect from other antiseptics, so far as our patriotism is concerned, in that it was first made and employed by one of our own countrymen in San Francisco; but at that time the preparation of it was so imperfectly carried out that foreign matters made it too irritating for general use and it was discarded, only to be better prepared and more widely used in Germany, some years later.

In the *Therapeutische Monatshefte* for January, 1889, NITSCHMANN, of Erfurt, gives his experience, and that of others, in the use of sozoiodol. He finds that it is of value as an antiseptic and disinfectant in wounds which are in a diseased state, and in acute stomatitis and pharyngeal catarrh he employs it in the form of a five per cent. watery solution. He has also found it useful in acute, in purulent conjunctivitis, and in blennorrhœa neonatorum in the proportion of two parts of sozoiodol to thirty parts of water.

He treats urethritis, of a specific type, by employing the preparation known as zinc-sozoiodol in a two per cent. solution, and he also finds it of value in mild and malignant vaginitis, first using, by means of a speculum, an application of pyroligneous acetic acid or nitrate of silver.

In the treatment of gynecological cases, particularly in catarrh of the cervix uteri, Nitschmann uses sozoiodol in the form of a powder applied by means of a tampon with good results, and it would seem as being worth a trial in many other states of the mucous membranes than those just named.

DR. JOHN CALL DALTON.

THE profession throughout the country will learn with the deepest regret of the death of Dr. John Call Dalton, which occurred at his residence in New York City last Tuesday.

Dr. Dalton was born at Chelmsford, Mass., on February 2, 1825, was educated at Harvard University, from which institution he received the degree of B.A. in 1844, and of M.D. in 1847. He early devoted himself to the study of physiology, and in 1851 his essay on the "Corpus Luteum of Pregnancy," which obtained the prize offered by the American

Medical Association, at once established his reputation as an able investigator in physiology. Shortly afterward he was appointed Professor of Physiology in the University of Buffalo, and, it is said, was the first in this country to use vivisection in class teaching. He resigned this chair in 1854 to accept a similar one in the Vermont Medical College, and three years later he accepted the chair of physiology in the Long Island College Hospital, and in 1855 he accepted the same chair in the College of Physicians and Surgeons of New York, which he held until 1883, when he retired from active teaching and accepted the Presidency of the College.

During the war he served in the army, first in April, 1861, as surgeon of the New York Seventh Regiment, and in August he was appointed brigade surgeon, and served until March, 1864, when he returned to New York City and reëntered upon his duties at the College of Physicians and Surgeons.

Dr. Dalton was a member of the National Academy of Sciences and of numerous medical societies. He was president of the Section of Physiology of the International Medical Congress held at Philadelphia in 1876.

Dr. Dalton was an earnest student and able writer. His "Treatise on Human Physiology," the first edition of which was published in 1859, has always justly enjoyed marked popularity, and was at once adopted as a standard text-book in all of our medical schools; it has gone through seven editions, the last having been published in 1882. He also wrote a "Treatise on Physiology and Hygiene for Schools" etc., which was published in 1868 and has been translated into the French Language; "The Experimental Method in Medicine;" "Doctrines of the Circulation;" "The Topographical Anatomy of the Brain," a beautifully illustrated atlas of which only two hundred and fifty impressions were printed, and copies of which are now highly prized.

In Dr. Dalton's death the profession has lost a member of the highest honor and integrity and one who by his character as a man and ability as a thinker, teacher and author, has largely contributed to the elevation of American medicine.

THE Secretary of War has issued an order relieving Surgeon George M. Sternberg from duty at Baltimore so as to afford him an opportunity of continuing his researches into the nature of yellow fever, and for this purpose Dr. Sternberg will visit

Havana and other points in Cuba. He began these investigations over a year ago under a special act of Congress and visited Cuba and Brazil. Later he returned to Florida during the epidemic in that State and visited the infected locality. He will submit the results of his researches to the Secretary of War in a report that will probably be made next fall.

SURGEON-GENERAL JOHN B. HAMILTON announces that in view of the recent enactment of a law prohibiting any original appointments in the Marine-Hospital Service, except to the rank of Assistant-Surgeon, thereby practically creating a life-tenure in the office of Supervising Surgeon-General, he has resigned the editorship of the *Journal of the American Medical Association*, his resignation to take effect with the issue of February 9th.

THE College of Physicians of Philadelphia have awarded the William F. Jenks Prize for the best essay on the "Diagnosis and Treatment of Extra-uterine Pregnancy," to Dr. John Strahan, of Bedford, Ireland. The prize amounts to the sum of two hundred and fifty dollars. The successful essay, which we understand is quite lengthy, will be published in the *Transactions* of the College.

WE regret to learn that, on account of ill-health, Dr. Mènière has been obliged to suspend temporarily the publication of the *Gazette de Gynécologie*.

REVIEWS.

THE PROPRIETY OF SURGICAL INTERFERENCE IN PERFORATING TYPHOID ULCER. By J. EWING MEARS, M.D., of Philadelphia. Pamphlet, 8vo. pp. 14. Philadelphia: 1888.

This interesting pamphlet is a reprint from the *Transactions of the American Surgical Association* for 1888. The author submits the following propositions in the hope that the experience of the future may prove that the limits of surgical art can be so extended as to include in the list of justifiable and successful operations, laparotomy in certain forms of perforating typhoid ulcer.

1. Surgical interference is not justifiable and should not be instituted in cases of typhoid fever in which perforation occurs when the infective process is at its height. This conclusion is based upon our knowledge of the morbid conditions peculiar to and present in the disease, and the effects produced by them upon the general system.

2. In mild cases of the disease, in which the pyrexia has not been of high grade and in which perforation occurs at the end of the third week, or later, when the

stage of convalescence is fully pronounced, laparotomy may be performed. Surgical interference in cases of this character is advocated with the hope that if the method of operation suggested by Lücke—laparotomy with the creation of an artificial anus—be adhered to, success may be accomplished.

3. Rapidity in operation will be an essential factor in the achievement of success, through which prolonged exposure of the cavity will be avoided and shock greatly lessened. Median incision having been made, the hand should be passed to the position of the ileo-cæcal junction, the ileum seized, drawn into the wound, and examined as it is slipped through the hand, which should remain in the cavity. The perforation being found, the portion of intestine including it should be quickly sutured to the edges of the abdominal incision, the sutures being introduced at sufficient distances from the ulcer edges to insure inclusion of healthy tissues. Hot antiseptic solutions should be then poured, in sufficient quantity, into the cavity, a glass drainage tube carried to the floor of the pelvic cavity, and the wound closed. Prolonged "toilette" of the peritoneal cavity, as it is generally understood, should not be made while the cavity is open. Irrigations through the drain tube should be made as soon as the cavity is closed, and should be repeated at such intervals as the surgeon may deem proper. So extremely rare is the occurrence of double or multiple perforation that, after the discovery of one opening, further search of a critical and prolonged character may be safely omitted. As in the cases in which operation is deemed advisable, the perforation is not due to the extension, *per se*, of the ulcerative action, but to what may, almost always, be designated as a mechanical cause, the absolute quietude of the patient, which must be enforced, as well as the rest secured to the intestine by the operation for production of artificial anus, whereby the free escape of the feculent contents and gas is facilitated, will contribute largely to the prevention of further perforations. Should the patient survive, relief from the artificial anus can be obtained by operation.

SOCIETY PROCEEDINGS.

MEDICAL SOCIETY OF THE STATE OF NEW YORK.

*Eighty-third Annual Meeting, held at Albany,
February 5, 6, and 7, 1889.*

THE PRESIDENT, DR. SAMUEL B. WARD, of Albany, called the Society to order, and made a brief inaugural address.

DR. B. F. SHERMAN, after the transaction of some preliminary business, offered the following resolution in reference to

MALPRACTICE SUITS,

which was adopted.

Whereas, There is now a bill before the Legislature which requires those commencing suits for libel against publishers and editors to give bail for all costs; and

Whereas, Ninety per cent. of all suits brought for malpractice are for blackmail, therefore be it

Resolved, That the Committee on Legislation be hereby instructed to use all honorable means to have this bill amended so as to include cases of malpractice.

A number of papers were then read, of which our special correspondent has sent us abstracts as follows:

DR. JAMES B. HUNTER, of New York, read a paper on

THE TECHNIQUE OF VAGINAL HYSTERECTOMY.

Two points must be considered in the discussion of this subject, one as to the immediate result of the operation, and the other as to its permanent result. Both must be good in order that the operation may hold position as a justifiable surgical procedure. It has been decided for some time by comparative statistics that the immediate results of vaginal hysterectomy are not worse than those of many other major surgical procedures, and the recently published statistics of Secheyron seem to show that the permanent results in many cases are also good. The dangers of the operation arise from shock, hemorrhage, peritonitis, and septicæmia. As to the first of these, rapidity of operation seems to lessen the danger of shock in this as in other serious gynecological operations. The dangers from hemorrhage have also been greatly reduced since the introduction by Péan of hæmostatic forceps for clamping the broad ligaments. These are not only far easier of application than ligatures, but they are also more efficient and safer. In twelve hysterectomies, in which the clamp forceps have been used by the author, only two deaths have occurred.

The details of the operation, as given by the author, did not differ materially from those which are given by various operators. He advocated the use of creolin in a two per cent. solution as a dressing, and also the use of creolin gauze as a vaginal packing subsequent to the operation. If the ovaries or tubes came into view during the operation, they might be removed, otherwise they need not be disturbed. If clamp forceps were used, ligatures were seldom necessary, and as many as fourteen clamp forceps could be used if conditions required them. It was important to tie the handles of the forceps together as a safeguard against slipping. The gauze was usually left in the vagina four days, and then the forceps might also be removed. The author did not think it necessary to close either the vaginal or the peritoneal wound, and additional time would thereby be saved. In none of his cases had there been either hemorrhage or infection. He had not used the cautery as a hæmostatic, as he had never found it necessary; there was also some danger in its use to the intestines and other structures.

There was little discharge from the wound during the first week, and still less during the second. Patients were sometimes able to be about by the beginning of the third week. The hæmostatic forceps favor drainage, there is less danger to the ureters than with the ligatures, and they enable one to destroy diseased tissues which are not always accessible to the ligature. The longest forceps are not always the best, those with a bite of an inch and a half are sufficiently long, and one need not try to take in too much tissue with a single instrument.

DR. THOMAS A. EMMETT believed that an important point to consider was the duration of immunity from a recurrence of malignant disease which was to be obtained by such operations. If immunity could be obtained from two to four years, as it frequently was, he believed the operation was justifiable. Personally he was inclined to favor the supra-vaginal amputation of the cervix as sufficiently radical, and had obtained good results from such operations. He thought the radical

operation was indicated in sarcoma, while it was sometimes questionable in carcinoma. He was much in favor of an abdominal operation for extirpation of the uterus, a modification of Freund's operation, which had recently been performed by Dr. L. A. Stimson.

DR. ANDREW F. CURRIER thought that there must always be a difference of opinion among operators as to a preference for a partial or a complete removal of the uterus for cancer. One's conduct in such matters would be largely influenced by personal experience and predilections. Another indication for the operation of hysterectomy was obstinate prolapse of the uterus, especially in women who had passed the menopause, and in whom other measures for the relief of this condition had failed. The point which was advanced by the author of the paper as to the value of the hæmostatic forceps in shortening the duration of the operation of hysterectomy, was a valuable one, and one which could be readily appreciated by one who had experienced the great difficulties which were sometimes encountered when the ligature was used. As to the instruments which were useful in performing the operation, he favored those which were used by Martin, viz., the perineal retractor of Simon, lateral retractors, and a volsella in each lip of the cervix for drawing down the uterus.

DR. ANDREW F. CURRIER, of New York, read a paper entitled

THE DISORDERS OF MENSTRUATION,

which will appear in full in our next issue.

DR. A. JACOB had seen many cases of so-called vicarious menstruation in young girls, manifested especially in the form of nose-bleed. He did not think this bleeding was always due to disorder of the pelvic circulation. It frequently came from heart weakness, especially in the case of schoolgirls who sat for hours at their tasks. He believed that in such cases treatment should be directed to the condition of the heart, and digitalis, sparteine, or strophanthus, in suitable doses, should be prescribed. He asked the author what he would do to restore, or to establish, the menstrual flow in such cases.

DR. C. E. LOCKWOOD, of New York, thought the special point in the paper was the improvement in the nomenclature of the symptoms heretofore expressed by the old terms amenorrhœa, dysmenorrhœa, menorrhagia, and vicarious menstruation. These have been loosely used to express a number of symptoms of, in great part, general and local structural, and in small part, functional, disease. They are largely symptomatic, and the names are unmeaning and indefinite in many connections in which they have been used. Etymologically, amenorrhœa means absence of the monthly flow, but it has been used not only in this signification, but also as expressive of defective or scanty and vicarious menstruation. By menorrhagia, is understood profuse monthly flow. Any suggestion which will reduce these terms to greater definiteness and system, and convey to the mind the condition and its etiology, is of value.

DR. HENRY C. COE, of New York, read a paper entitled

THE EARLY RECOGNITION OF CANCER OF THE CERVIX UTERI.

(See page 169.)

DR. A. L. LOOMIS, of New York, read a paper entitled

MANAGEMENT OF CARDIAC DILATATION BASED ON ITS ETIOLOGY.

In the diagnosis of heart disease, twenty years ago, murmurs were considered all-important elements. These and the various morbid changes of the valves by which they were caused, were the principal factors which were taken into consideration. Now they are only considered as adventitious sounds, which indicate the seat of certain valvular lesions. As long as the rhythm of the heart remains normal and the walls are in a normal condition, it is now considered that a heart is not in a serious condition. The heart may be hypertrophied, but this condition is compensatory, and indicates that the danger-line has not yet been reached. The tissues of the heart must be healthy, also the nerves by which it is supplied, and the blood which flows through it must also be healthy, in order to the well-being of the organ, and when these conditions are deviated from, there is weakening of the walls and dilatation. Serious heart disease, too, cannot be divorced from other diseased conditions with which they may be associated, such as general impaired nutrition, etc., conditions which are so commonly seen in poor workingwomen living on a diet of bread and tea. Such persons demand a change of diet, many hours of daily exercise in the open air, and suitable doses of arsenic.

In those cases in which dilatation results from softening of the cardiac muscle in convalescence from severe disease, patients should be kept in bed in the recumbent position, no exciting surroundings being allowable, and suitable doses of quinine and strychnia should be administered as long as the irregularity of heart action continues. In dilatation from fatty softening of the heart, angina and digestive disorders are frequent accompaniments; hence, the functions of the liver and stomach must be carefully guarded. Such cases demand spare diet and rest; or if exercise is indicated, it must be of the gentlest character. In their treatment calomel is appropriate, also arsenic, strychnia, and iron, the latter being given alone, never in combination. Digitalis should never be given. In an emergency a hypodermatic of morphia will be of great temporary benefit, also bichloride of mercury in doses of one-sixtieth of a grain. If Graves's disease is present, graduated doses of strychnia will be of great service. In the dilated heart which proceeds from excessive venery, the speaker had found good results from the daily use of thirty to sixty grains of bromide of potassium.

In all cases the life and habits should be carefully regulated, without the use of medicines. As long as hypertrophy continues, and when the venous system becomes engorged, large doses of the tincture or the infusion of digitalis should be used. This drug is always indicated as soon as loss of compensation with its attendant symptoms is present, for by this means the arterial pressure will be raised. It should be continued as long as the flow of urine is abundant, but it should be stopped when the urine begins to diminish. The quantity to be given will vary with the susceptibility of the patient, and the largest quantity should be given at bedtime. Squill increases the action of digitalis more than any other drug which can be combined with it, and its combination with calomel is also useful. The other cardiac tonics, strophanthus, convallaria, and adonidine,

do not have a diuretic action, and are not so useful as digitalis.

Dilatation from obstruction of the pulmonary circulation is always in the right heart, and is sometimes relieved by the use of leeches over the sternum, wet cups over the right lung, or the abstraction of ten or twelve ounces of blood from the arm. Atheroma of the heart walls, the aorta, and the coronary arteries is most frequently met in women, and when followed by dilatation is sometimes due to excessive recoil of the aorta. Remedial agents for this condition must be used promptly during the compensatory stage, and the bromide of potassium may be given with good results. In dilatation from ventricular hypertrophy and arterial sclerosis, improvement of the blood must be sought by a vegetable and milk diet, by citrate of potash, colchicum, buchu, and other agents, which will assist in the removal of the nitrogenous matters from the body. If this is not successful, temporary relief may be obtained by the use of full doses of digitalis, but the usual course in such cases is rapidly downward.

DR. A. JACOBI thought there was one class of dilated hearts which had not been referred to by the author, namely, that which occurred not infrequently in young children. In the newborn infant the aorta is normally small. If the pulmonary artery is too small, the body would have too little and the heart too much blood. It would thus be over-nourished and a pathological condition would result. In such cases the arteries over the entire body may also be too small. This condition not infrequently results in general anæmia, chlorosis, and pernicious anæmia, and at the autopsies of such cases the heart is found dilated. As to the value of digitalis for dilatation of the heart, this drug is not simply a heart stimulant, it also nourishes the heart muscle. Small doses of it may be given for very long periods when there is a condition of general debility. Sparteine is also very useful; it acts promptly, and may be combined advantageously with digitalis.

DR. GEORGE M. STERNBERG read a paper on

THE ETIOLOGY OF CROUPOUS PNEUMONIA.

Acute pneumonia is now considered by the best authorities as an acute specific disease, one in which there is something special in the inflammatory process. The object of the author is to bring forward the history of the experimental evidence which bears upon this view of the etiology of the disease. The microorganism of the disease is widely diffused and is probably not acquired by personal contact. The disease may occur, however, as an epidemic in prisons or barracks, in villages or in single houses, just as is the case with cholera or yellow fever. The cases may bear no especial relation to each other, however, but simply have a relation to a common environment, like exposure to cold, alcohol, etc. The disease prevails over a wide area of the earth. Its direct transmission to those who are brought in contact with it, as attendants upon the sick, is probably of very rare occurrence. The specific microorganism is found in the buccal secretion of healthy individuals. It might be objected that this makes the argument concerning its pathogenic character untenable, but with our present knowledge this does not follow, for pus cocci, also the cocci of tetanus, are found among the healthy, but produce disease only under certain conditions. Traumatism

is one of the essential factors to the production of this disease, the bacillus being also a component factor, and it is necessary that it be introduced into a favorable location, there being a wide difference in the susceptibility of the tissues to invasion. Other factors may be reflex vaso-motor paralysis of a part of the lung, which enables the microbe to do its work, also many changes in the cocci themselves which may change their pathogenic activity.

The coccus of pneumonia was described in 1882 by Friedländer, and in the same year by Leyden and Gunther. Matri published observations in 1883; and the same coccus was also found by him and others in different diseases. In 1882, Friedländer described the results of his experience with blood cultures, upon which the fact of the oval pneumococcus was established. Talamon also described to the Anatomical Society of Paris, in 1883, a few days after Friedländer's paper was read, a lanceolate coccus which he obtained from pneumonic exudate after death, or from blood drawn during life. He produced genuine lobar fibrinous pneumonia with pleuritic and pericardial complications with it in rabbits. This coccus is not identical with that which was discovered by Friedländer, but with one which was discovered by the reader from his own buccal secretions in 1880, and which was named by him *micrococcus Pasteuri*. He inoculated rabbits with it at that time with fatal results, but did not discover that his coccus differed from that of Friedländer until 1885. Fränkel found that the coccus of saliva (*M. Pasteuri*) more frequently caused pneumonia than that which was obtained from rusty sputum.

Weichselbaum's *diplococcus pneumoniae* is also found to be a more frequent cause of pneumonia than is that of Friedländer. Gamaleia concluded from extensive experiments in mice, and also from a review of the entire subject, that pneumonia is usually caused by the *micrococcus Pasteuri*. The author believed that many reports concerning the micrococcus of Friedländer should be credited to the *micrococcus Pasteuri*; for the two are entirely dissimilar as is shown by staining, Gram's method resulting in a discoloration of the former but not of the latter.

Experiments which have been performed with the *micrococcus Pasteuri* upon dogs and sheep were also described. The disease which was produced in them was far less fatal than in mice, showing far less insusceptibility to its virulence. In this respect pneumonia in dogs and sheep is similar to that disease in human beings. The probability is that in these higher animals the coccus does not invade the blood extensively. The author's early experiments, which were abundantly verified and published before those of the others mentioned, entitle him to the credit of the discovery of this microorganism.

DR. WILLIS E. FORD, of Utica, then read a paper on

GALVANISM IN GYNECOLOGY.

If a constant current of electricity be passed through living tissue certain changes are brought about, due partly to chemical decomposition and the separation of the fluids of the tissues and partly to a change in the nutritive processes produced by polarization of the ultimate molecules of matter. The results obtained depend wholly upon the character of the current used. From

the study of electricity itself and a proper appreciation of the various qualities of a current as much may be expected as from the study of the morbid conditions for which it is prescribed. Dynamic electricity of great volume or ampère is capable of great destructive power just in proportion to the quantity of zinc acted upon within the battery. While such a current may be capable of producing cautery effects it will not push its way through dense tissue for any distance. For this purpose a number of independent elements connected up in a series is necessary. The voltage or the pressure power of a current is as important therefore in therapeutics as is quantity or ampère. It has been found that a current that is strong enough to push its way through a fibroid tumor of the uterus as large as a cocoanut, must possess the pushing power or tension of from twelve to sixteen volts. If, therefore, the battery used for the purpose of dispersing fibroid tumors has this requisite voltage, the ampère may vary within certain limits and yet good results be obtained. A battery with large cells gives no greater voltage than a battery with small cells and small elements, while the ampère of the battery depends wholly upon the size of the elements used.

The author was convinced that one of the reasons why galvanism is not more generally and successfully used, is that portable batteries or batteries having but a single fluid, as they are constructed by instrument-makers, are wholly inadequate for the purpose. The two-fluid batteries, on the other hand, are so expensive that few practitioners possess them. The ordinary bichromate of potash battery, which is unquestionably the best form of battery, will answer every purpose if the cups in which the elements are immersed are sufficiently large that the current may not run down. Such a battery of fifteen cells holding a quart each, with some simple contrivance by which the zincs and carbons can be readily lowered into the fluid, makes a most perfect instrument for gynecological practice. The ampère, or volume of a current, is easily regulated by the depth to which the zincs and carbons are plunged in the fluid, while the tension, or voltage, or pressure of the current is regulated by the switch board, depending entirely upon the number of cells used.

The foregoing description has been thus minute, since the results in the practice of the author have seemed to depend largely upon the quality of the current. A galvanometer is of but little service, while a set of Brenner's resistance coils attached to the cabinet batteries is rarely used, the milliampèremeter being the chief guide. The volume of the current may be so large, however, that the latter is not always a safe guide; for instance, if a current from twelve cells is used, and the elements have an exposure to the fluid of forty square inches each, great care must be taken to prevent the vaginal electrode from cauterizing the tissue, even if the milliampèremeter marks but 100 or 150. There seems to be no guide, other than experience, regarding the safety of currents of large ampère. Where twelve or more such cells are used, the author had found it unsafe to have more than twenty square inches of zinc surface exposed in each cell, if the fluid is fresh. If pain is produced by the electrode in the vagina, it is evident that the limit of intensity has been reached. If the electrode is held firmly against a fibroid mass, and the voltage is increased until the milliampèremeter marks 150 to 200, and there is still no pain in the vagina, no harm will be done,

In removing the products of circumuterine inflammation, a current of large ampère will be the most efficient—that is, about 100 milliampères. The author's first paper upon the effect of galvanism in peritoneal adhesion, was published in the *Medical Press of Western New York* for April 1888, and stated what was believed to be entirely new at that time, namely, that peritoneal adhesions about the pelvic organs, and even about the abdominal viscera, can be effectually removed by means of the stronger galvanic current. These conclusions were reached from the behavior of fibroid tumors under treatment in cases in which there had been localized peritonitis with fixation both of the tumor and of the adjacent organs. Pain was speedily relieved, and the tumors became movable, even before there was any perceptible diminution in their size. This occurred so uniformly that it seemed evident that galvanism must be an efficient agent for the removal of organized inflammatory exudates. In the paper referred to, fifteen cases of fibroid tumor were reported, and four of peritoneal adhesions. Further experience has led to a modification in the method of using this agent, and also to the conclusion that the current used ought not to be the same in cases of simple hyperplasia of the uterus, or subinvolution, or in cases of chronic pyosalpinx, as in the denser fibroid tumors. In the latter, it has usually been found that a current generated from small cells, and having, therefore, comparatively small ampère, but high voltage, is the most useful. On the other hand, the same currents, when passed through a mass of exudative material surrounding or near the uterus, has in several instances excited a new inflammatory process, and has not secured ready absorption as in cases in which the current had greater electrolytic power, and in which the milliampèremeter marked only 80 to 100.

That a proper current of galvanism will stop the growth, and diminish the size of uterine fibroids, is no longer questioned, but how much may be accomplished by this agent in the removal of products of inflammation has not yet been fully determined. The author used galvanism in 64 cases during the year 1888, 31 being hospital, and 33 private cases. Of these, 19 were fibroid tumors of the uterus, 11 being sub-serous, 4 submucous, and 4 intramural. There were 5 cases of chronic pelvic peritonitis with extensive adhesions, 7 of localized pelvic peritonitis, in which the adhesions were limited to one locality, 4 of hydrosalpinx, 4 of chronic pelvic cellulitis, the exudate having matted the organs involved into one mass, 9 of retroversion of the uterus, with fixation, 10 of chronic metritis, 1 of chronic ovaritis, 3 of acute ante flexion with metritis. Of the 4 cases of hydrosalpinx, 1 discharged into the bladder, 1 into the rectum, and 1 into the vagina. In no case did a subperitoneal or an intramural fibroid disappear entirely, no matter how long the galvanism was used, but the growth was checked, and the troublesome symptoms disappeared. Very large masses, with accumulations of fluid about them, improved most rapidly, and the fluid disappeared in all cases. The current in such cases was of a strength of 200 milliampères, and was sent directly through the tumor, from side to side of the abdominal wall. In other cases, the negative electrode was placed in the vagina, against the projecting mass, the positive electrode being upon the abdomen, and consisting of a large dispersion plate of copper, covered with French punk and chamois.

Intramural growths are best treated by the abdomino-vaginal method. In two or three cases submucous fibroids disappeared, all bleeding being stopped, though that was not accomplished suddenly. It was not found that the positive electrode exerted a more beneficial effect than the negative, and the former was rarely used in the uterus or vagina. A current of 50 to 100 milliampères was all that was necessary to remove inflammatory exudates in every case, so that the conclusion was reached that persistency and skill were all that were necessary in such cases to ultimate success, if the general health were fairly good.

The fluid of a hydrosalpinx and the enlargement of an ovaritis will alike disappear by this means of treatment. In a few cases of acute anteflexion with chronic metritis, the platinum electrode has been passed just beyond the curve in the uterus, and has caused slight sloughing; with the use of a current of large ampérage the result has always been satisfactory. If the patient is debilitated, and the exudate around the broad ligaments recent, inflammatory symptoms may occur if an attempt is made to cause absorption by galvanism. The author stated that he had never seen any harm follow the passage of the strongest current through the abdominal viscera. Healthy tissues, in which there is a normal quantity of fluid, furnish a good conducting medium for electricity, while the new connective tissue, which contains almost no bloodvessels, is a very poor conductor, and is thus susceptible to the effects of the current.

The author had not used the puncturing needle of Apostoli in any case, and he had had no serious accident, though he had frequently observed that the general health of the patient was not so good when under active treatment as previously, and also that it was sometimes two or three months after the galvanism was stopped before the full benefits of the treatment were appreciated. The number of applications should vary between twelve and twenty, and the intervals between them should be four days.

The following were elected

OFFICERS FOR THE ENSUING YEAR:

President.—Daniel Lewis, of New York.

Vice-President.—Alfred Mercer, of Syracuse.

Secretary.—F. C. Curtis, of Albany.

Treasurer.—Charles H. Porter, of Albany.

Censors.—L. Emmet Holt, of New York; S. Sherwell, of Brooklyn; E. M. Hermance, of Yonkers; Joseph Lewi, of Albany; Thompson Burton, of Fultonville; Leroy McLean, of Troy; Robert Fraser, of Camden; C. L. Stiles, of Oswego; J. H. Glass, of Utica; H. L. Elsner, of Syracuse; Frank H. Potter, of Buffalo; B. R. Fordyce, of Union Springs.

CORRESPONDENCE.

A RARE COMPLICATION OF LABOR, SIMULATING RUPTURE OF THE UTERUS.

To the Editor of THE MEDICAL NEWS,

SIR: The extreme rarity of the accompanying case, occurring in the wards of Dr. Carl Braun, of Vienna, and sent to me by my son, Dr. J. Whitridge Williams, prompts me to forward it to you, with the request that

you be kind enough to publish it in your valuable journal.

Yours truly,

P. C. WILLIAMS, M.D.

BALTIMORE, February 11, 1889.

The following case, which I was fortunate enough to see, in the wards of Dr. Carl Braun, of Vienna, is certainly worthy of mention, because of its extreme rarity;

A. B., pregnant with her eleventh child, entered the hospital after having been in labor for forty-eight hours. When I saw her, four hours later, she was in a state of collapse and had no labor pains.

On external examination we found that the abdomen, in the umbilical region, was of a yellow hue; and the lower portion of the abdominal cavity and the pelvis were filled with liquid in which the uterus could be freely ballotted *en masse*. The foetus was dead, and presented by the vertex.

Naturally, from the condition of the patient, Dr. Braun diagnosed either a rupture of the uterus or a rupture of the vessels of the broad ligament.

Owing to the complete inertia uteri and a very small pelvis, craniotomy was performed, and the child extracted by the cranioclast. The placenta was extracted manually, and the interior of the uterus was examined with the utmost care, but no trace of rupture could be found. In view of this fact, the diagnosis of ruptured broad ligament was made, and such diagnosis appeared to be correct at the time.

No exploratory incision was made, and death followed in fourteen hours. The autopsy revealed the pelvis filled with a *large quantity of bile*, which had flowed from a rupture at the junction of the common bile-duct with the hepatic duct, and had produced a general peritonitis, which caused death.

The uterine walls showed no sign of rupture, save at one point, where the uterine peritoneum presented, a short linear rent, which, however, did not extend into the muscular layer. No preëxisting inflammation or other cause for the rupture of the bile-ducts could be found.

I report this case on account of its great rarity. So far as I can learn, it is unique; and Dr. Braun states that in all his experience he has never seen or heard of a similar case.

Probably none of us will ever be required to diagnose between an acute hæmatocoele and a case similar to this. Should we meet with an apparent case of uterine rupture, and find none, it would be well to remember that the bile-duct has been ruptured during labor with the production of similar symptoms, and that, in the case here reported, the lower part of the abdomen was stained of a yellow color, while the remainder of the surface was of normal appearance.

J. WHITRIDGE WILLIAMS.

VIENNA.

NEWS ITEMS.

Philadelphia Neurological Society.—At the annual meeting of this Society held January 28, 1889, the following officers were elected:

President.—Dr. S. Weir Mitchell.

Vice-Presidents.—Drs. Horatio C. Wood and Wharton Sinkler.

Secretary.—Dr. J. Madison Taylor.

Treasurer.—Dr. Guy Hinsdale.

Recorder.—Dr. William H. Morrison.

Council.—Drs. Charles K. Mills, Francis X. Dercum, and James Hendrie Lloyd.

An Unexpended Balance.—Press dispatches from Washington state that the unexpended balance of the appropriation by Congress to pay for medical and other service during the illness of the late President Garfield is about \$10,000, and that Dr. D. W. Bliss, the chief physician in attendance on the President, and who received only \$6,500, is a claimant for this unexpended balance.—*Boston Med. and Surg. Journal*, Jan. 31, 1889.

Honors to Pasteur.—The King of Greece has conferred on M. Pasteur the Grand Cross of the Saviour, the highest Greek order. Dr. Grancher, the director of the Pasteur Institute, and Dr. Roux and Dr. J. Guyon, assistants, are made Commanders of the same Order.—*Brit. Med. Journ.*, Jan. 26, 1889.

Accuracy of Diagnosis.—Lawson Tait says, in his recently published lectures on ectopic pregnancy and pelvic hæmatocele: "I once saw a surgeon, who is now a baronet and has a court appointment, remove a breast with a tumor in it. After he had the whole thing in his hands, he drew his knife across the tumor, and out spirted a lot of laudable pus. He had made his explorative incision after the treatment was complete. Absolute accuracy of diagnosis in the abdomen is very far from being possible; only the ignorant assert that it is, and only fools wait for it."—*Boston Med. and Surg. Journal*, Jan. 31, 1889.

The Potato-cure for Swallowed Foreign Bodies.—DR. SALZER, at a meeting of the Medical Society of Vienna, held January 11, 1889, stated that he had treated a six year old boy, who had swallowed a small weight, a woman, who had swallowed a set of teeth, and a nine year old girl, who had swallowed a nail, by the method advocated by Dr. Cameron of Glasgow, which consisted in feeding the patients for several days on nothing but potatoes. This treatment, which in all three cases was followed by success, is a method in vogue among the pickpockets of London, who swallowing their booty live on potatoes until the stolen articles appear *per vias naturales*.—*Berliner klin. Wochenschrift*, Jan. 28, 1889.

Massage and Masseur.—DR. METZGER, the famous masseur of Holland, puts himself out for no one. The Empress of Austria, and the princes and princesses who seek his treatment, must all go to him. The Pope is the only one with whom he makes an exception, the doctor going to Rome to treat him. He receives no one at his private residence; his clients, who come from all parts of the world, assemble twice daily in the drawing-rooms of the Amstel Hotel, and passing in their turn a few minutes with the doctor, they each and all submit to the special treatment adapted to their respective ailment, which treatment is generally successful. This celebrated specialist was formerly a butcher's boy; his careful observations of the muscular action of different animals, was the foundation of his success as a specialist.—*Progrès Medical*, January 12, 1889.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF OFFICERS SERVING IN THE MEDICAL DEPARTMENT, U. S. ARMY, FROM FEBRUARY 5 TO FEBRUARY 11, 1889.

By direction of the Secretary of War, JEDEDIAH H. BAXTER, *Colonel and Chief Medical Purveyor*, will proceed to New York City on public business connected with the Medical Department, and, on completion thereof, return to his station in this city.—Par. 17, S. O. 30, A. G. O., Washington, February 5, 1889.

By direction of the President, JOSEPH C. BAILY, *Lieutenant-Colonel and Assistant Medical Purveyor*, and CHARLES L. HEIZMANN, *Major and Surgeon*, are detailed as members of the Army Retiring Board, at San Antonio, Texas, convened by War Department Order dated January 16, 1888, published in S. O. No. 12, January 16, 1888, from Headquarters of the Army, vice Lieutenant-Colonel Edward P. Vallum, and Major Francis L. Town, hereby relieved.—Par. 15, S. O. 28, A. G. O., Washington, February 5, 1889.

The Medical Director will proceed to Fort Buford, Dakota, on public business connected with the Medical Department, and, upon completion of duty, will rejoin his station.—Par. 8, S. O. 14, Headquarters Department of Dakota, St. Paul, Minnesota, February 5, 1889.

By direction of the President, in pursuance of the authority contained in the provisions of the Act of Congress approved March 3, 1887, "Making appropriations for sundry civil expenses of the Government," etc., relating to the methods of preventing the spread of epidemic diseases, GEORGE M. STERNBERG, *Major and Surgeon* (U. S. Army), will proceed to the Island of Cuba, for the purpose named in the letter of the President addressed to the Secretary of War, April 17, 1888, and, upon completion of this duty, will return to his proper station, and submit his report to the President.—Par. 16, S. O. 30, A. G. O., Washington, February 5, 1889.

By direction of the Secretary of War, GEORGE M. STERNBERG, *Major and Surgeon*, is relieved from duty as Attending Surgeon and Examiner of Recruits at Baltimore, Maryland, to enable him to comply with the requirements of Par. 16, S. O. No. 30, of the 5th inst.—Par. 4, S. O. 31, A. G. O., Washington, February 6, 1889.

KILBOURNE, HENRY S., *Captain and Assistant Surgeon*.—Having complied with Par. 2, S. O. No. 6, Department of the Columbia, will return to his station, Vancouver Barracks, Washington Territory.—Par. 1, S. O. 9, Headquarters Division of the Pacific, San Francisco, California, February 2, 1889.

By direction of the Secretary of War, the leave of absence granted LOUIS A. LA GARDE, *Captain and Assistant Surgeon*, in S. O. No. 290, December 13, 1888, from this office, is extended three months.—Par. 2, S. O. 31, A. G. O., Washington, February 6, 1889.

By direction of the Secretary of War, ROBERT W. SHUFELDT, *Captain and Assistant Surgeon*, having appeared before the Army Retiring Board, at Fort Leavenworth, Kansas, in compliance with Par. 1, S. O. No. 4, January 5, 1889, from this office, will repair to this city, to await action on the proceedings in his case.—Par. 12, S. O. 32, A. G. O., Washington, D. C., February 7, 1889.

MEARNS, EDGAR A., *Captain and Assistant Surgeon* (Fort Snelling, Minnesota).—Will proceed, without delay, to Fort Pembina, Dakota, and report to the commanding officer of that post, for temporary duty.—Par. 3, S. O. 12, Headquarters Department of Dakota, St. Paul, Minnesota, January 31, 1889.

MEARNS, EDGAR A., *Captain and Assistant Surgeon*.—Is relieved from temporary duty at Fort Pembina, Dakota, and will rejoin his station, Fort Snelling, Minnesota, without delay.—Par. 4, S. O. 14, Headquarters Department of Dakota, St. Paul, Minnesota, February 5, 1889.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF THE MEDICAL CORPS OF THE U. S. NAVY, FOR THE WEEK ENDING FEBRUARY 9, 1889.

HALL, J. H., *Passed Assistant Surgeon*.—Ordered to Naval Hospital, Washington, D. C.

ECKSTEIN, H. C., *Surgeon*.—Detached from U. S. Steamer "Adams," and wait orders.

DIXON, W. S., *Surgeon*.—Detached from special duty at Baltimore, Maryland, and ordered to the U. S. Steamer "Boston."